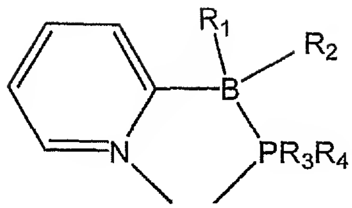
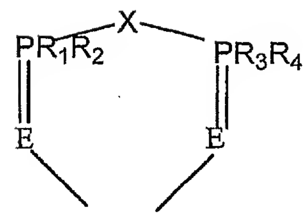
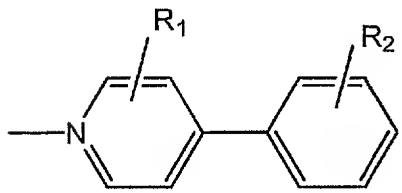
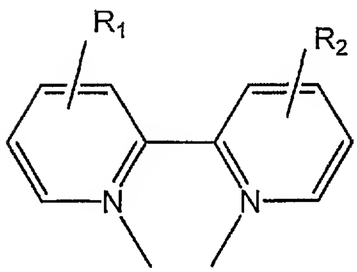
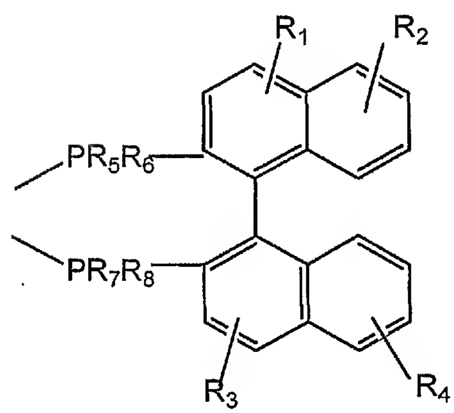


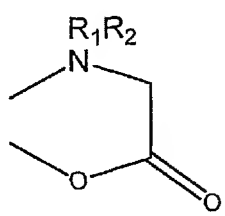




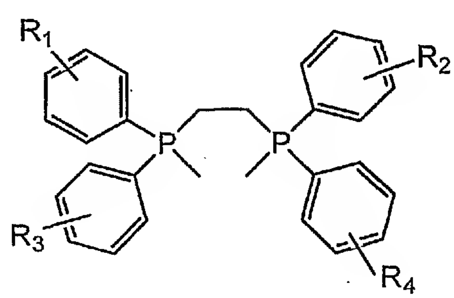
X = CH, N and
E = O, S, Se, Te

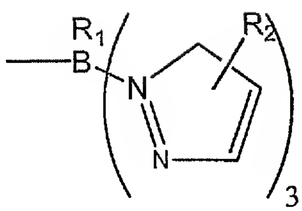


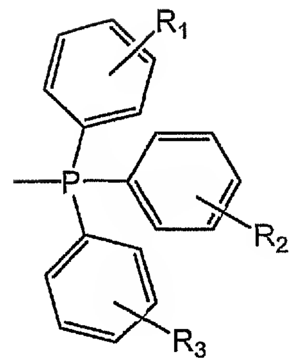




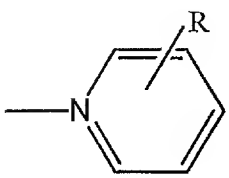
—R







and



,

wherein R, R_1, R_2, R_3, R_4, R_5, R_6, R_7 and R_8 are, independently, hydrogen, halogen, alkyl or aryl.

10. The organic light emitting device of claim 1, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about $1x10^5$ per second and wherein the energy level of the lowest triplet excited state of

the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

11. The organic light emitting device of claim 2, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about $1x10^5$ per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

12. The organic light emitting device of claim 3, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about $1x10^5$ per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

13. The organic light emitting device of claim 4, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about 1×10^5 per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

14. The organic light emitting device of claim 5, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about 1×10^5 per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

15. The organic light emitting device of claim 6, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about 1×10^5 per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

16. The organic light emitting device of claim 7, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about 1×10^5 per sccond and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

17. The organic light emitting device of claim 8, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about $1x10^5$ per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

18. The organic light emitting device of claim 9, wherein the emissive layer further comprises:

a host material having a lowest triplet excited state having a first decay rate of less than about 1 per second; wherein the organometallic compound is present as a guest material dispersed in the host material, the organometallic compound having a lowest triplet excited state having a radiative decay rate of greater than about $1x10^5$ per second and wherein the energy level of the lowest triplet excited state of the host material is lower than the energy level of the lowest triplet excited state of the organometallic compound.

19. The organic light emitting device of claim 10, wherein the energy difference between the lowest triplet excited state of the organometallic compound and a

corresponding relaxed stated of the organometallic compound has a corresponding wavelength of about 420 nm to 480 nm for blue light emission.

20. The organic light emitting device of claim 10, wherein the energy difference between the lowest triplet excited state of the organometallic compound and a corresponding relaxed stated of the organometallic compound has a corresponding wavelength of about 480 nm to 510 nm for aqua-blue light emission.

21. The organic light emitting device of claim 10, wherein the host material has a bandgap with an energy difference corresponding to about 470 nm and the organometallic compound has a lowest triplet excited state at an energy level at about 450 nm.

22. The organic light emitting device of claim 10, wherein the host material is an electron transport layer.

23. The organic light emitting device of claim 10, wherein the host material conducts electrons primarily through hole transmission.

24. The organic light emitting device of claim 10, wherein the ratio of the host material and organometallic compound decay rates is at least about 1:1000 to about 5:1000.

25. The organic light emitting device of claim 10, wherein the host material is TPD.

26. The organic light emitting device of claim 10, wherein a plurality of organometallic compounds are dispersed in the host material.

27. An organometallic compound comprising:

a heavy transition metal that produces an efficient phosphorescent emission at room temperature from a mixture of metal-to-ligand charge transfer and π - π^* ligand states;

at least one mono-anionic, bidentate, carbon-coordination ligand bound to the heavy transition metal, wherein the at least one mono-anionic, bidentate, carbon-coordination ligand is substituted with at least one of an electron donating substituent and an electron withdrawing substituent, wherein the at least one of an electron donating substituent and an electron withdrawing substituent shifts the emission, relative to an un-substituted mono-anionic, bidentate, carbon-coordination ligand, to either the blue, green or red region of the visible spectrum; and

at least one non-mono-anionic, bidentate, carbon-coordination ligand bound to the heavy transition metal, wherein the at least one non-mono-anionic, bidentate, carbon-coordination ligand causes the emission to have a well defined vibronic structure.

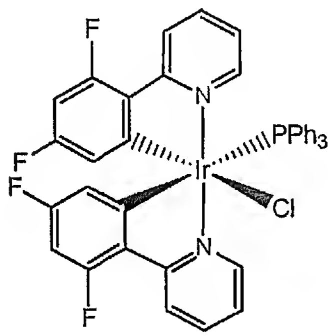
28. The organometallic compound of claim 27, wherein the heavy transition metal is selected from the group consisting of Os, Ir, Pt and Au.

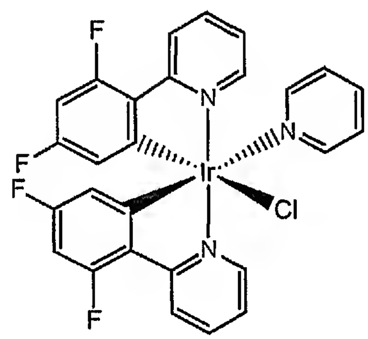
29. An organometallic compound comprising:

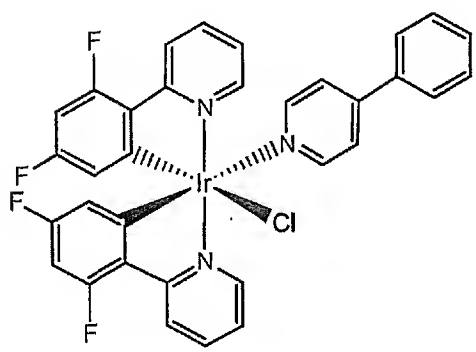
a heavy transition metal;

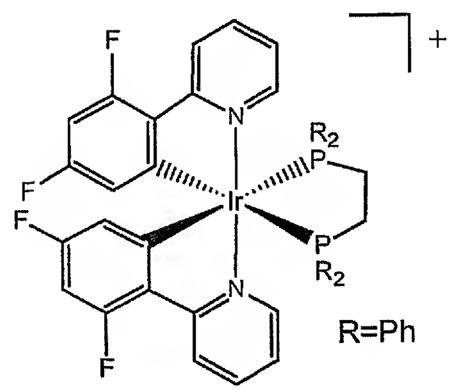
at least one mono-anionic, bidentate, carbon-coordination ligand bound to the heavy transition metal; and

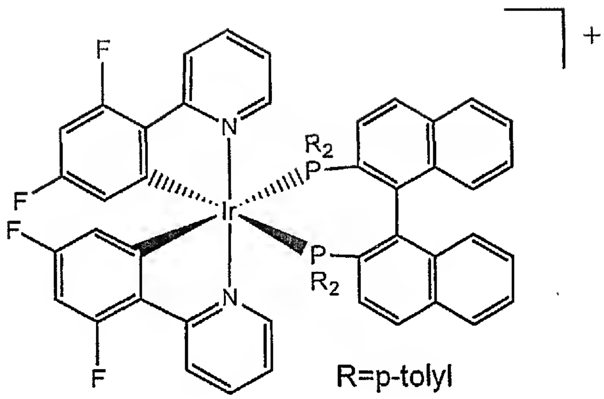
at least one non-mono-anionic, bidentate, carbon-coordination ligand bound to the heavy transition metal, wherein the organometallic compound has a chemical structure represented by a formula selected form the group consisting of:

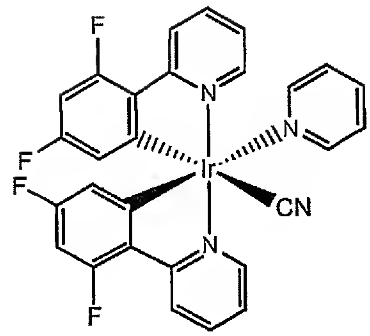


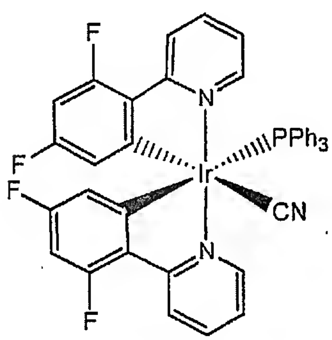


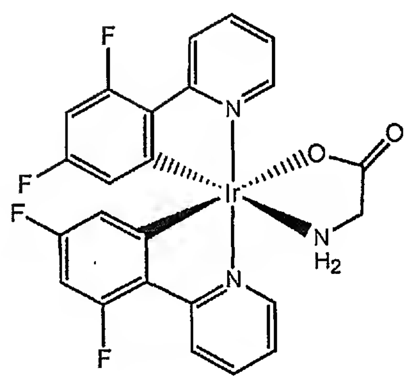


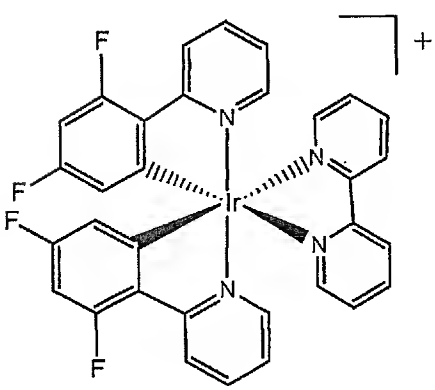


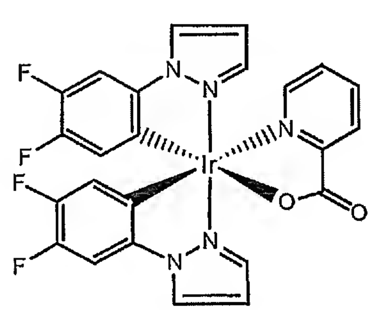

R=p-tolyl

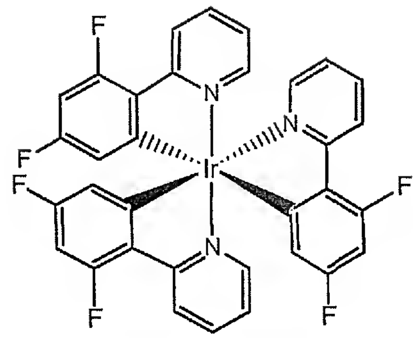


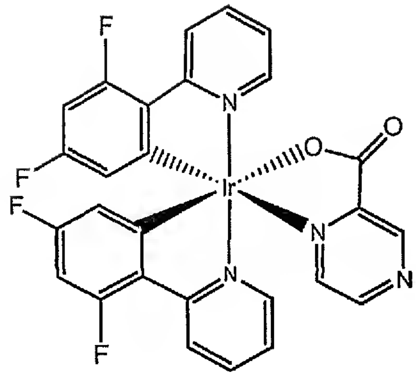


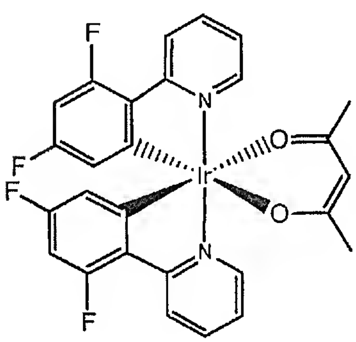


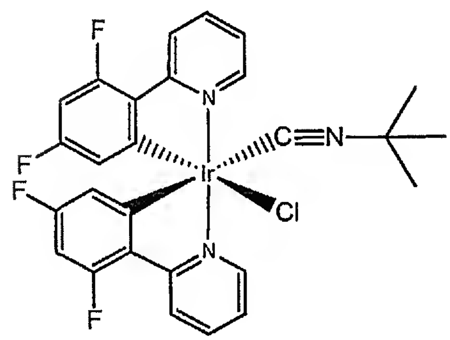


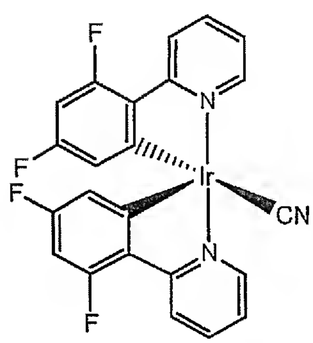


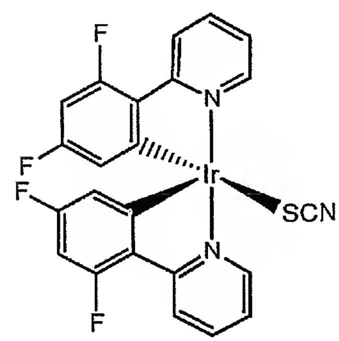


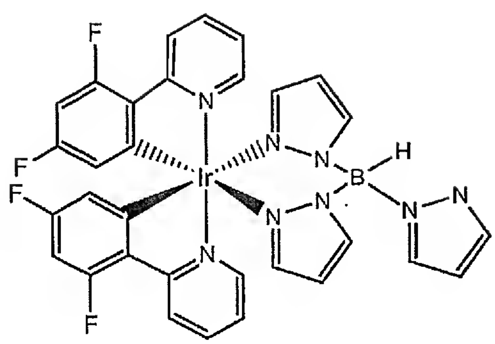


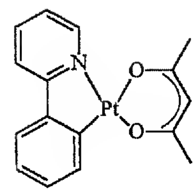


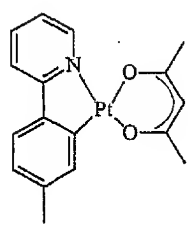


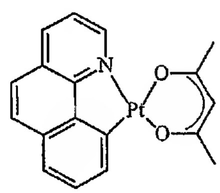


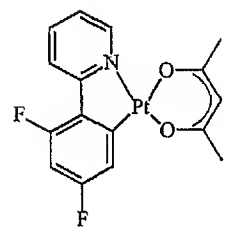


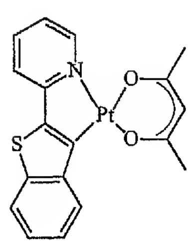


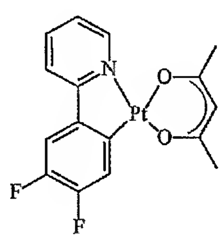




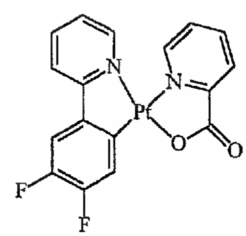








and

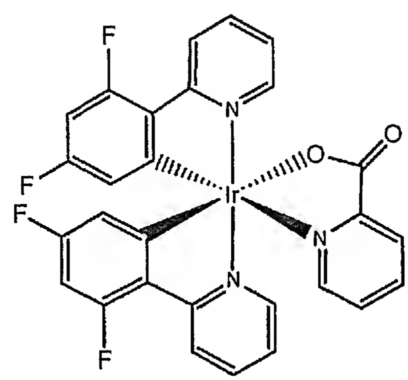


30. An organometallic compound comprising:

a heavy transition metal;

at least one mono-anionic, bidentate, carbon-coordination ligand bound to the heavy transition metal; and

at least one non-mono-anionic, bidentate, carbon-coordination ligand bound to the heavy transition metal, wherein the organometallic compound has a chemical structure represented by the following formula:



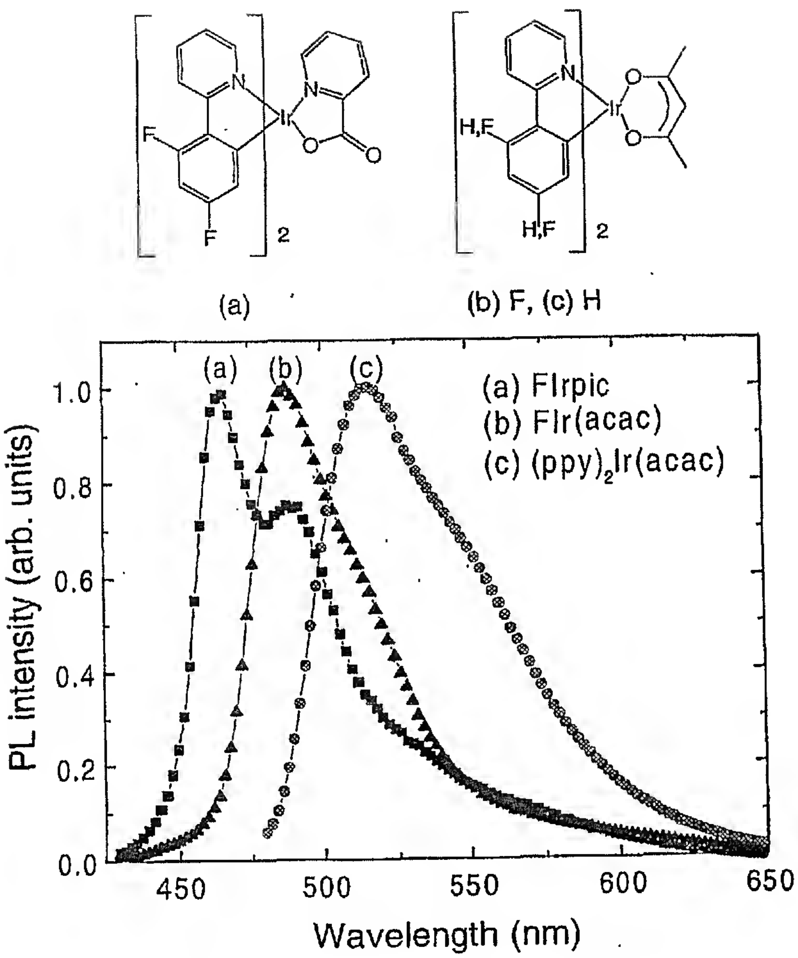

F
F
2
(a)
H,F
H,F
2
(b) F, (c) H
(a)
(b)
(c)
(a) FIrpic
(b) FIr(acac)
(c) (ppy)2Ir(acac)
PL intensity (arb. units)
Wavelength (nm)

Figure 1a:

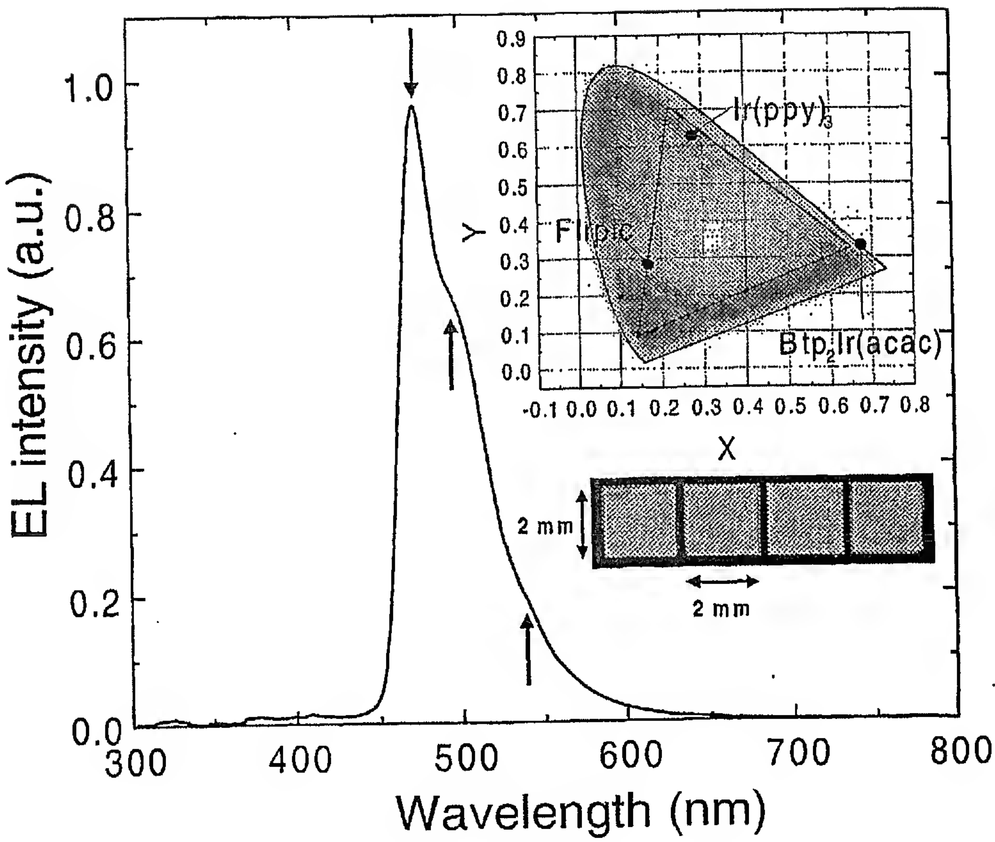

EL intensity (a.u.)
Wavelength (nm)
0.0
0.2
0.4
0.6
0.8
1.0
300
400
500
600
700
800
Y
X
Ir(ppy)3
FIrpic
Btp2Ir(acac)
2 mm
2 mm

Figure 1b:

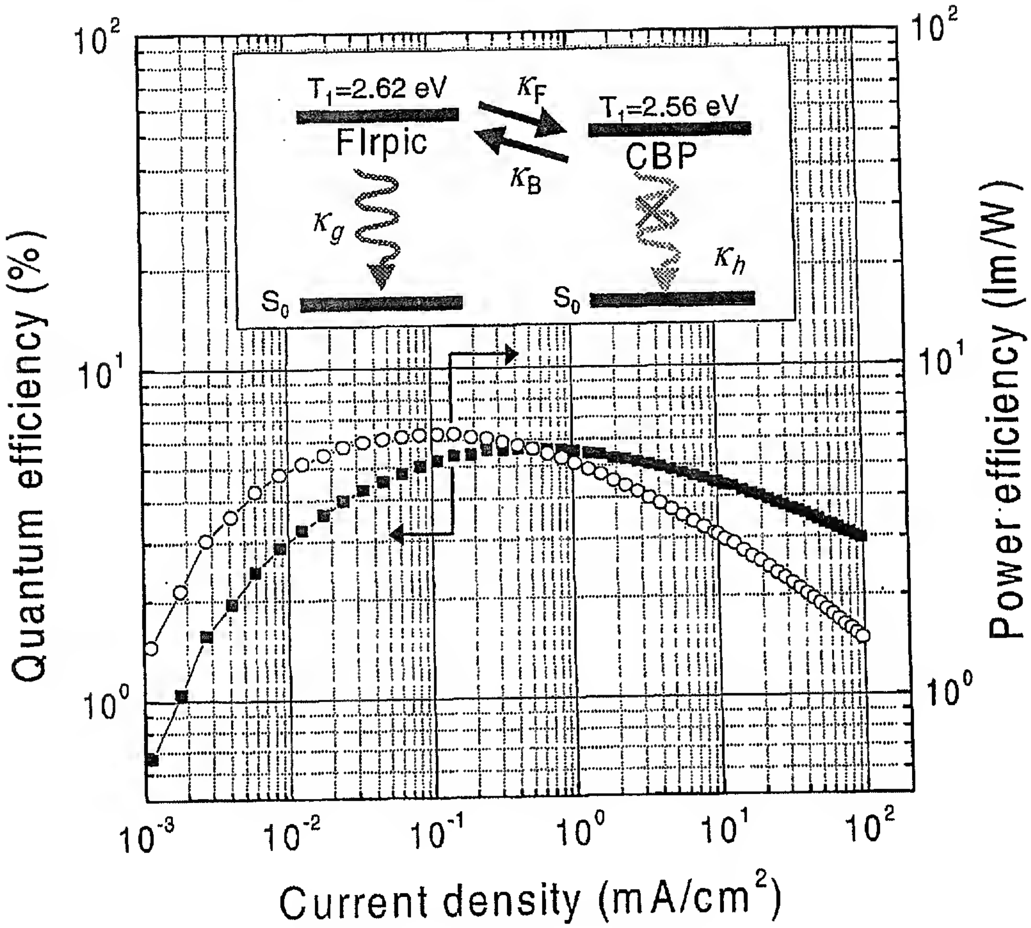

T$_1$=2.62 eV
FIrpic
κ_F
κ_B
T$_1$=2.56 eV
CBP
κ_g
κ_h
S$_0$
S$_0$
Quantum efficiency (%)
Power efficiency (lm/W)
Current density (mA/cm^2)
10^{-3} 10^{-2} 10^{-1} 10^{0} 10^{1} 10^{2}

Figure 2:

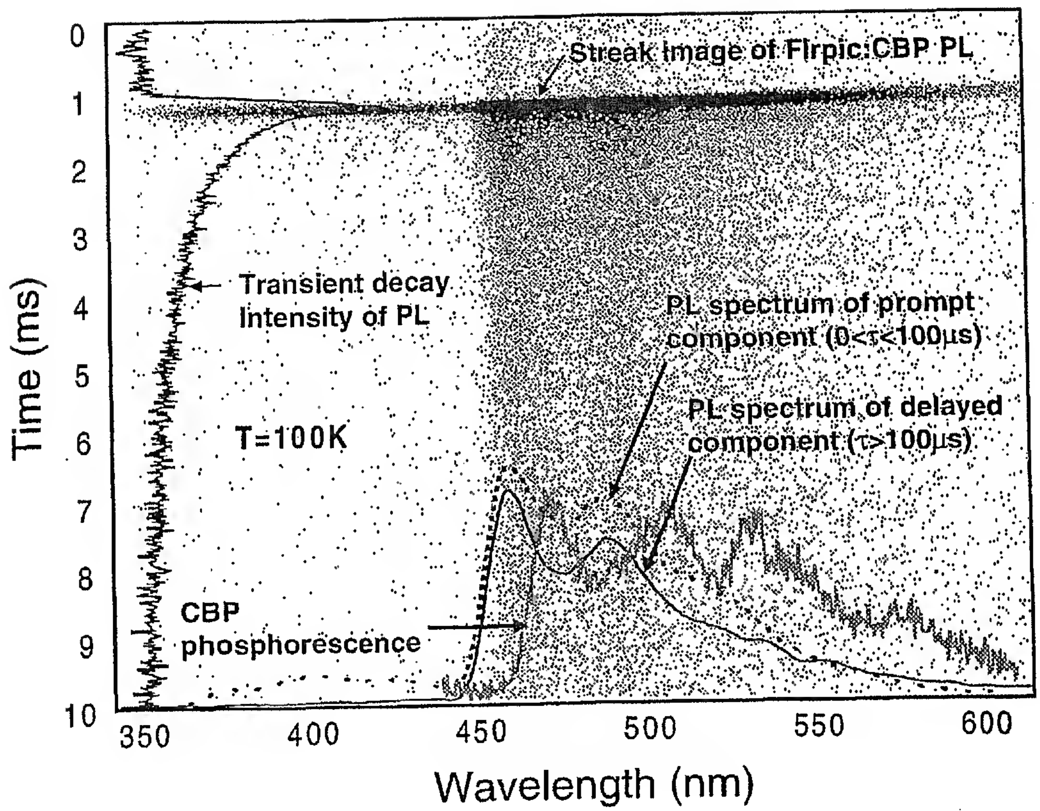

Streak image of FIrpic:CBP PL
Transient decay intensity of PL
PL spectrum of prompt component (0<τ<100μs)
PL spectrum of delayed component (τ>100μs)
T=100K
CBP phosphorescence
Time (ms)
0
1
2
3
4
5
6
7
8
9
10
350
400
450
500
550
600
Wavelength (nm)

Figure 3:

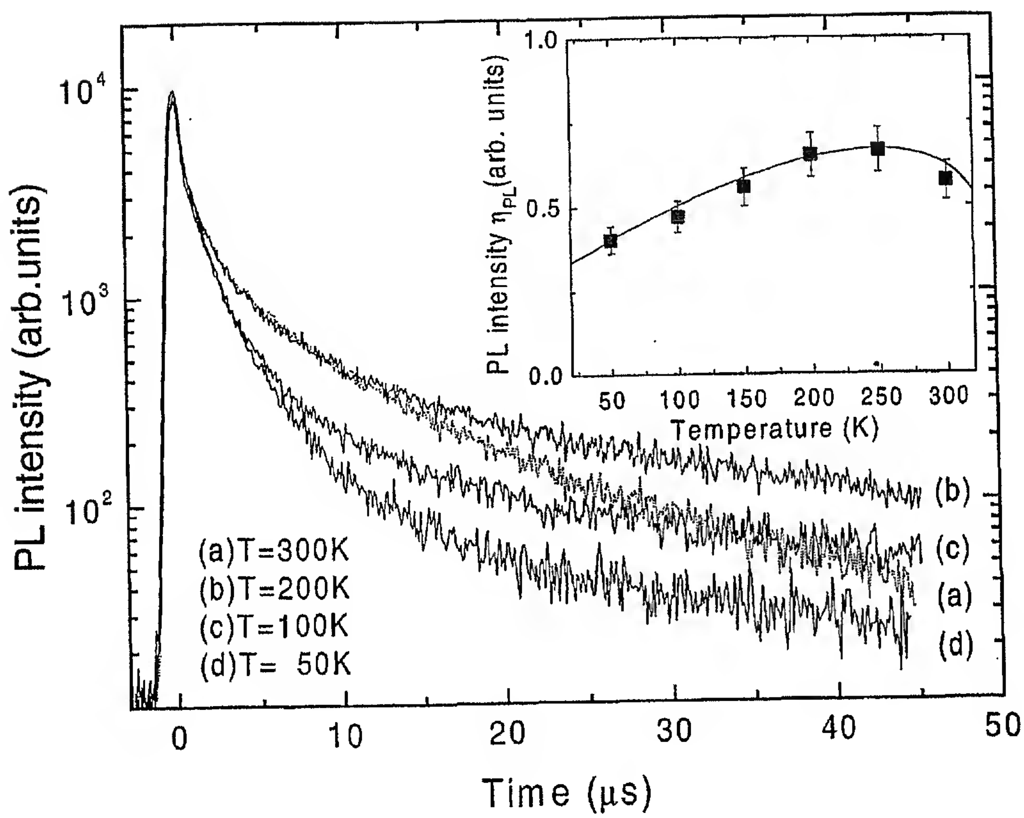
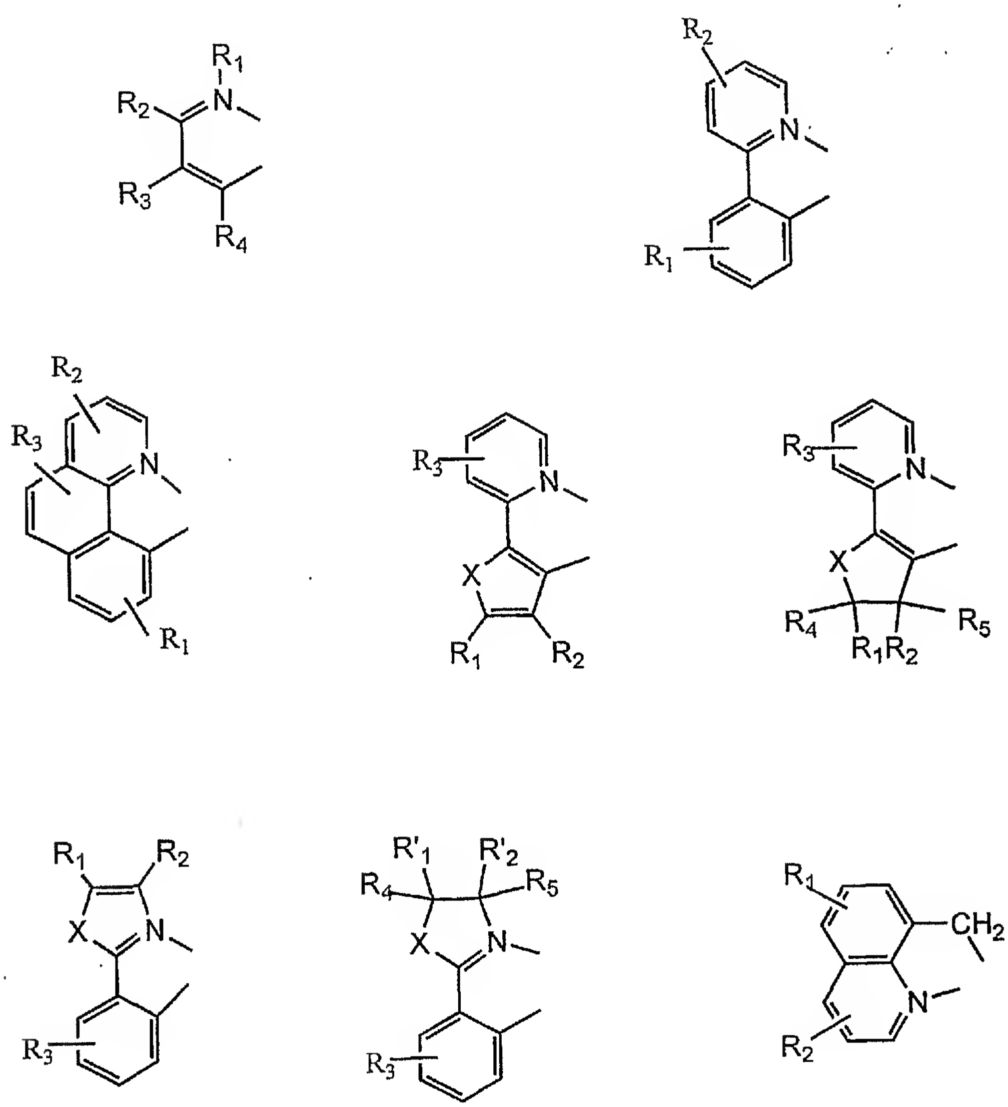

PL intensity (arb.units)
10^4
10^3
10^2
(a)T=300K
(b)T=200K
(c)T=100K
(d)T= 50K
(b)
(c)
(a)
(d)
0
10
20
30
40
50
Time (μs)
PL intensity η_{PL}(arb. units)
1.0
0.5
0.0
50
100
150
200
250
300
Temperature (K)

Figure 4:

figure 5a

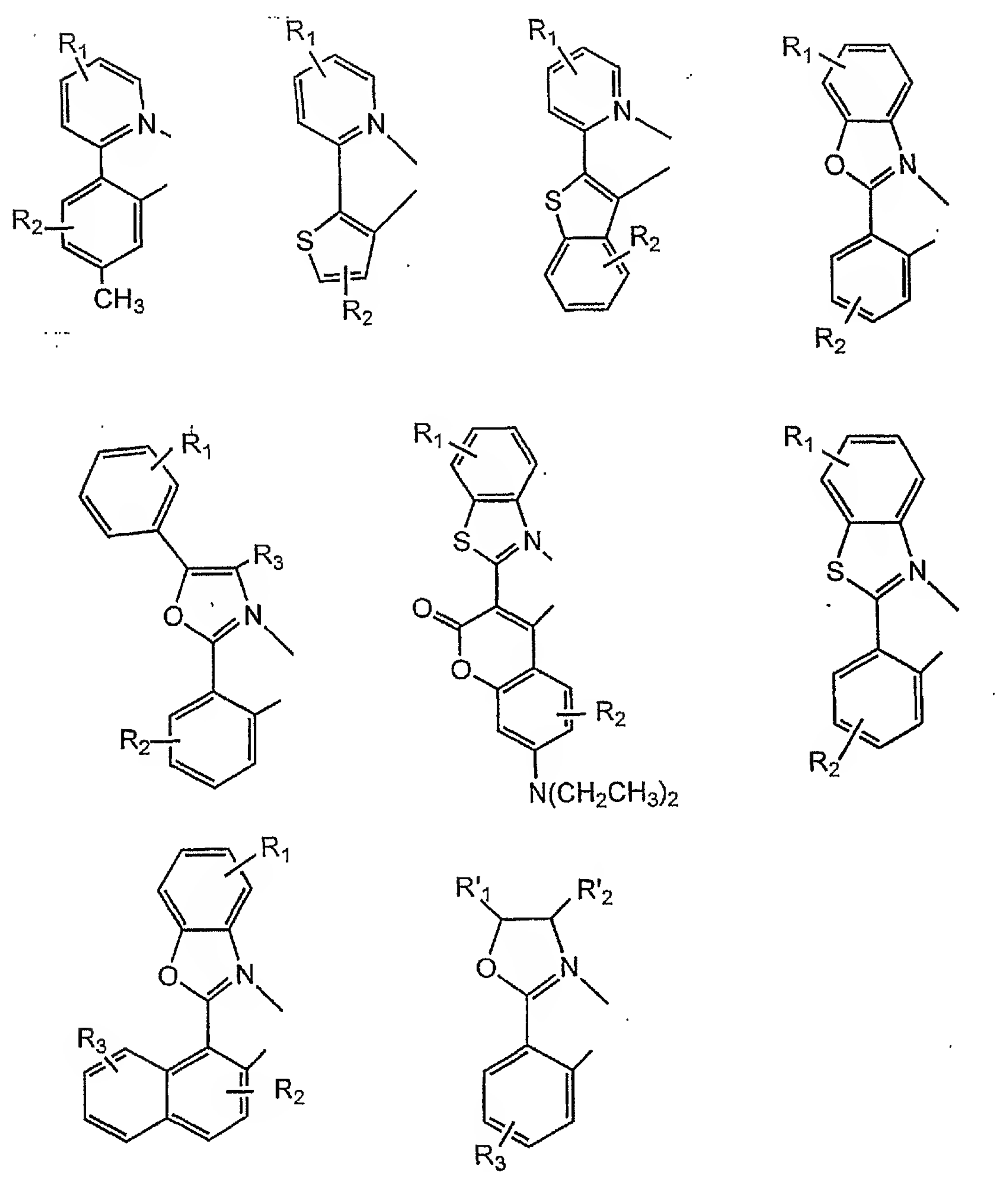
Generic Mono-Anionic, Bidentate, Carbon-Coordination Ligands-I



X = S, O, NR; and R_1, R_2, R_3, R_4 and R_5 are, independently, hydrogen, halogen, alkyl, aryl or arylene; and R'_1 and R'_2 may, in combination, be aryl.

Figure 5b

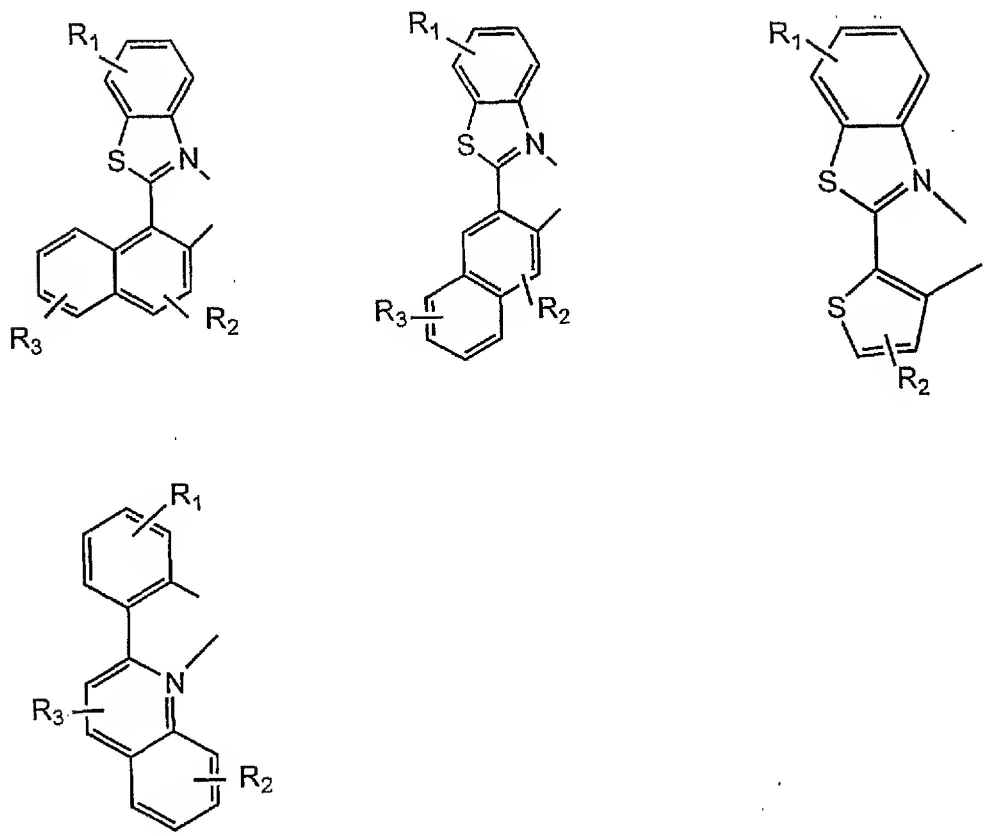
Generic Mono-Anionic, Bidentate, Carbon-Coordination Ligands-II



X = S, O, NR; and R_1, R_2, R_3, R_4 and R_5 are, independently, hydrogen, halogen, alkyl, aryl or arylene; and R'_1 and R'_2 may, in combination, be aryl.

Figure 5c

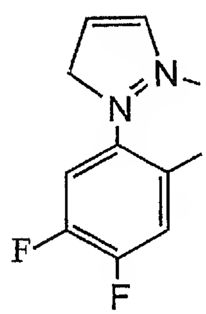
Generic Mono-Anionic, Bidentate, Carbon-Coordination Ligands-III

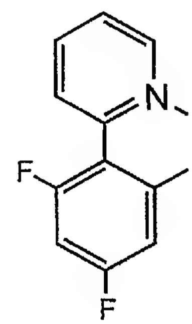


X = S, O, NR; and R_1, R_2, R_3, R_4 and R_5 are, independently, hydrogen, halogen, alkyl, aryl or arylene.

Figure 5d

Specific Mono-Anionic, Bidentate, Carbon-Coordination Ligands-I





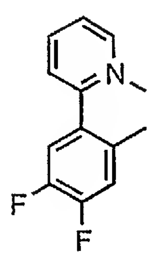
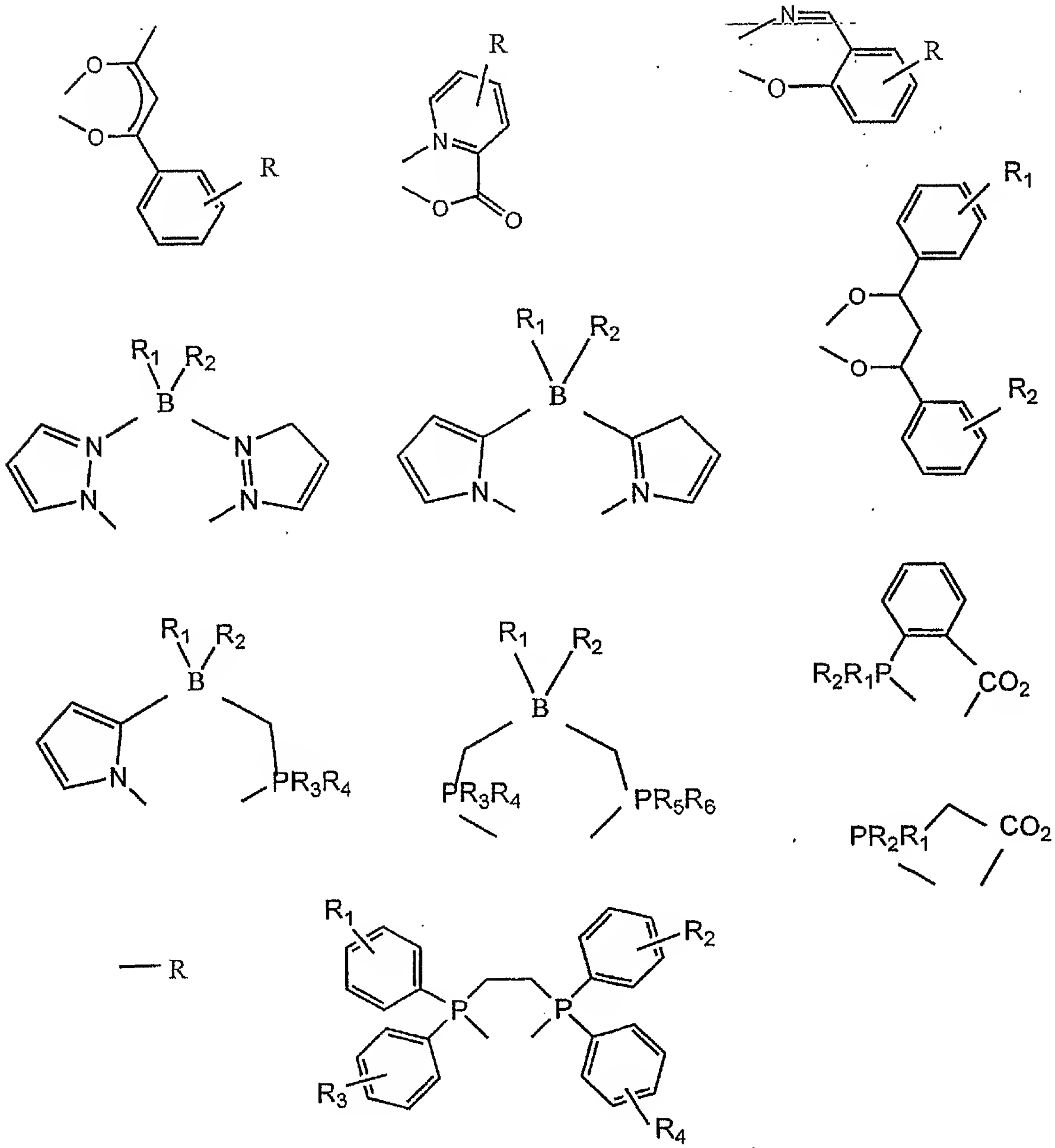


Figure 6a

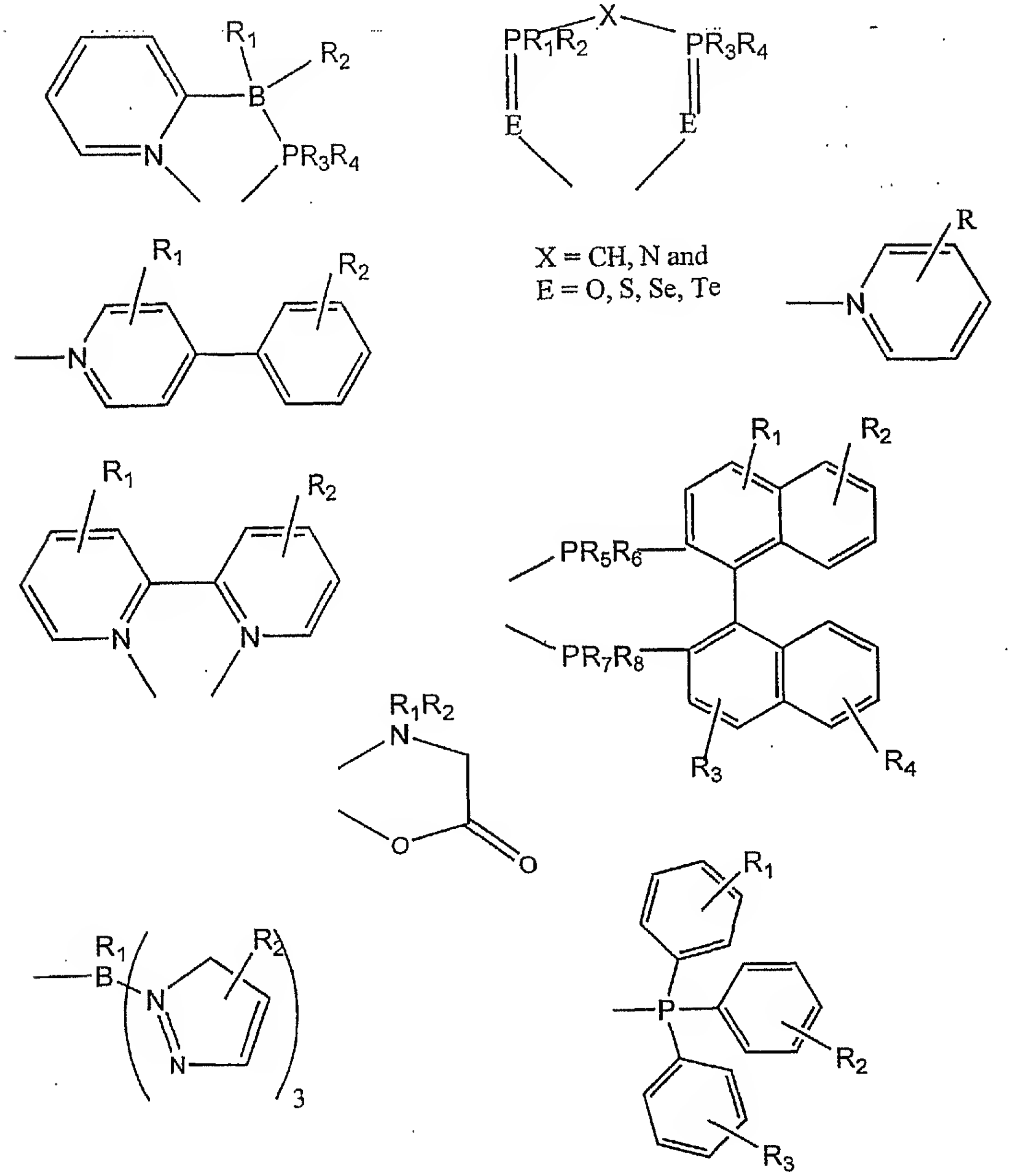
Generic Non-Mono-Anionic, Bidentate, Carbon-Coordination Ligands-I



R, R_1, R_2, R_3, R_4, R_5, and R_6 are, independently, hydrogen, halogen, alkyl or aryl.

Figure 6b

Generic Non-Mono-Anionic, Bidentate, Carbon-Coordination Ligands-II



R, R_1, R_2, R_3, R_4, R_5, R_6, R_7 and R_8 are, independently, hydrogen, halogen, alkyl or aryl.

Figure 6c

Specific Non-Mono-Anionic, Bidentate, Carbon-Coordination Ligands

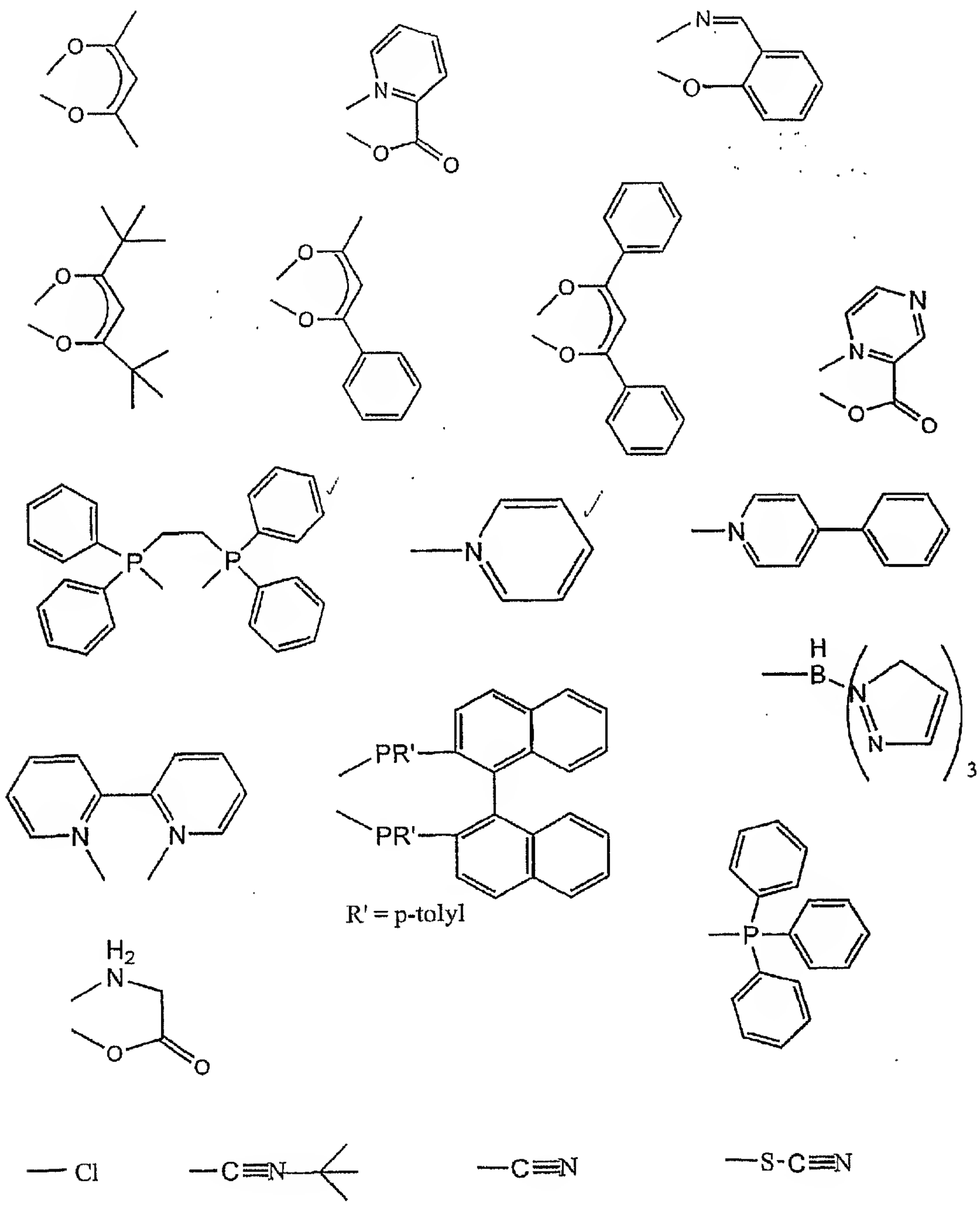


Figure 7a

[(4,6-F2ppy)2IrCl]2 + CNtBu in CH2Cl2

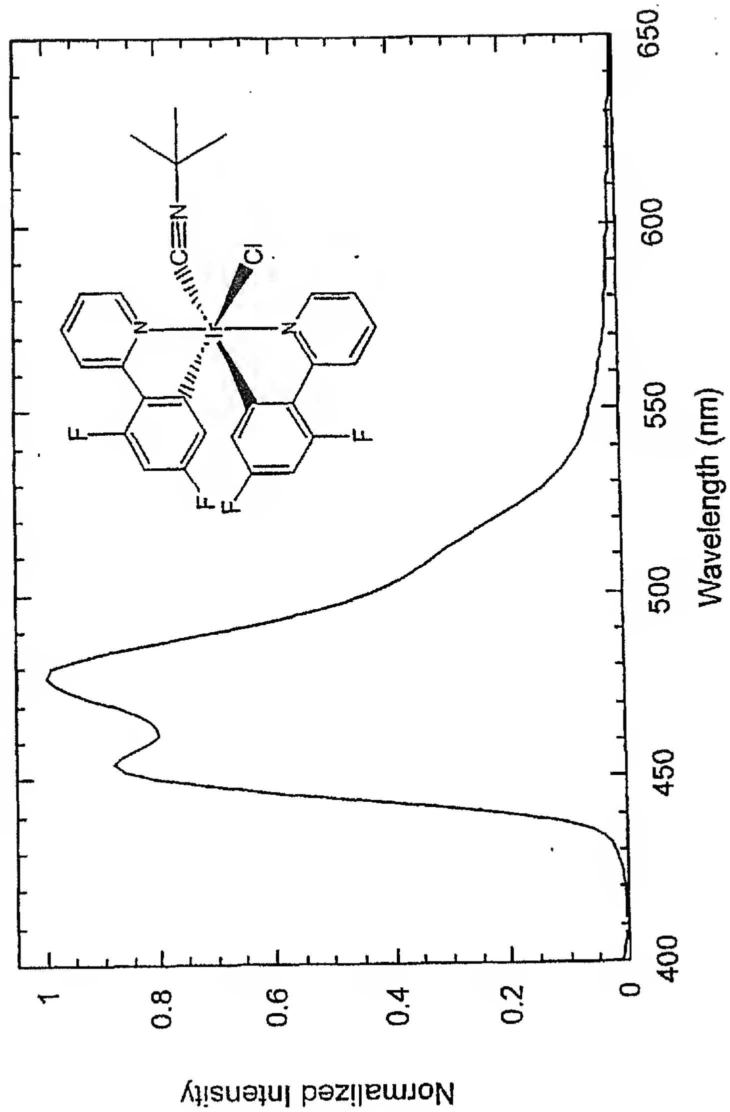


Figure 7b

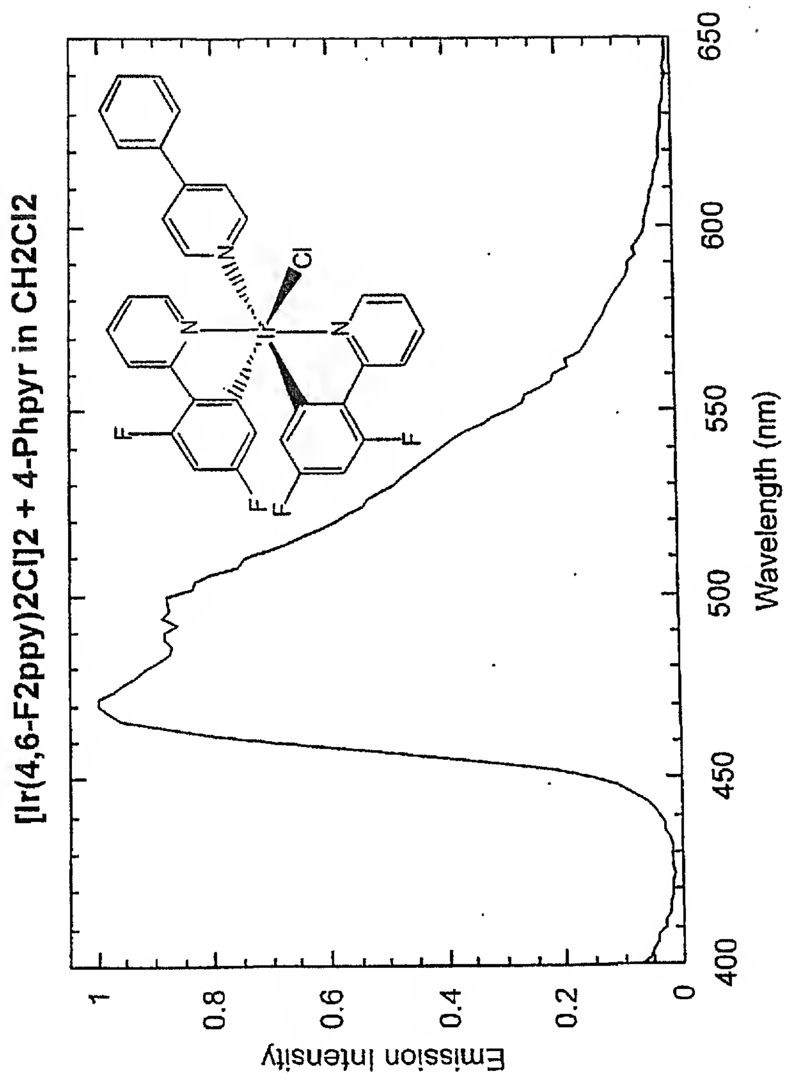

[Ir(4,6-F2ppy)2Cl]2 + 4-Phpyr in CH2Cl2
Emission Intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
F
F
F
F
N
N
N
Ir
Cl

Figure 7c

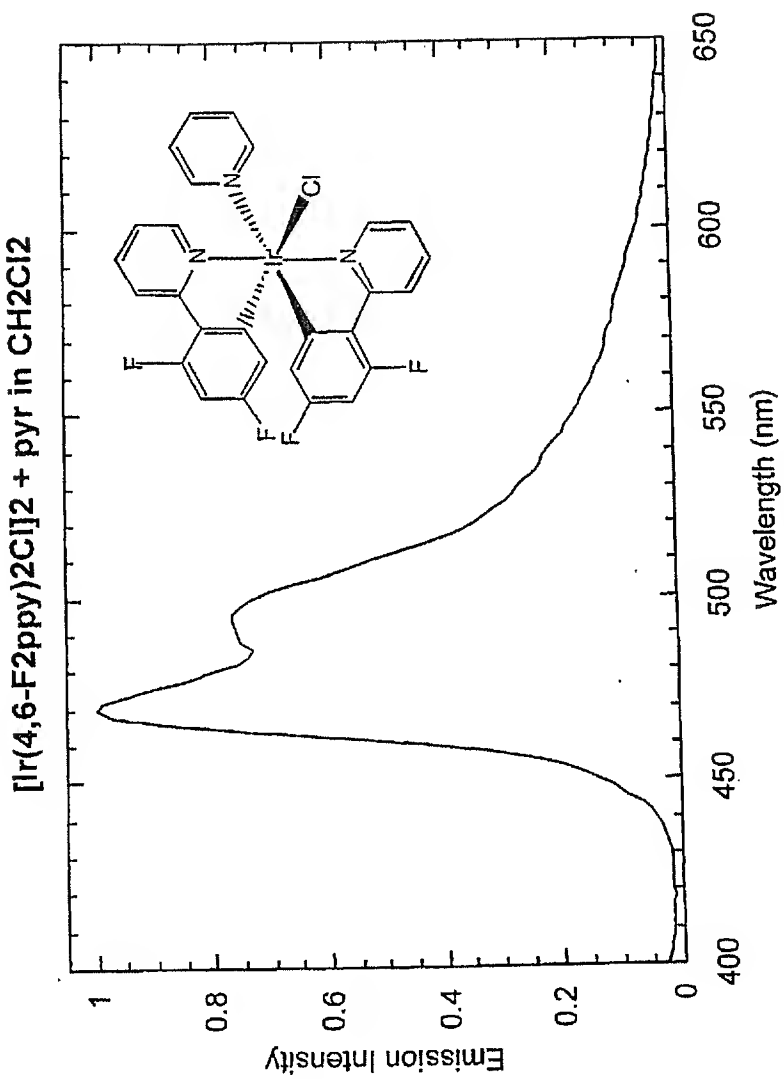

[Ir(4,6-F2ppy)2Cl]2 + pyr in CH2Cl2
Emission Intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
N
N
N
Cl
Ir
F
F
F
F

Figure 7d

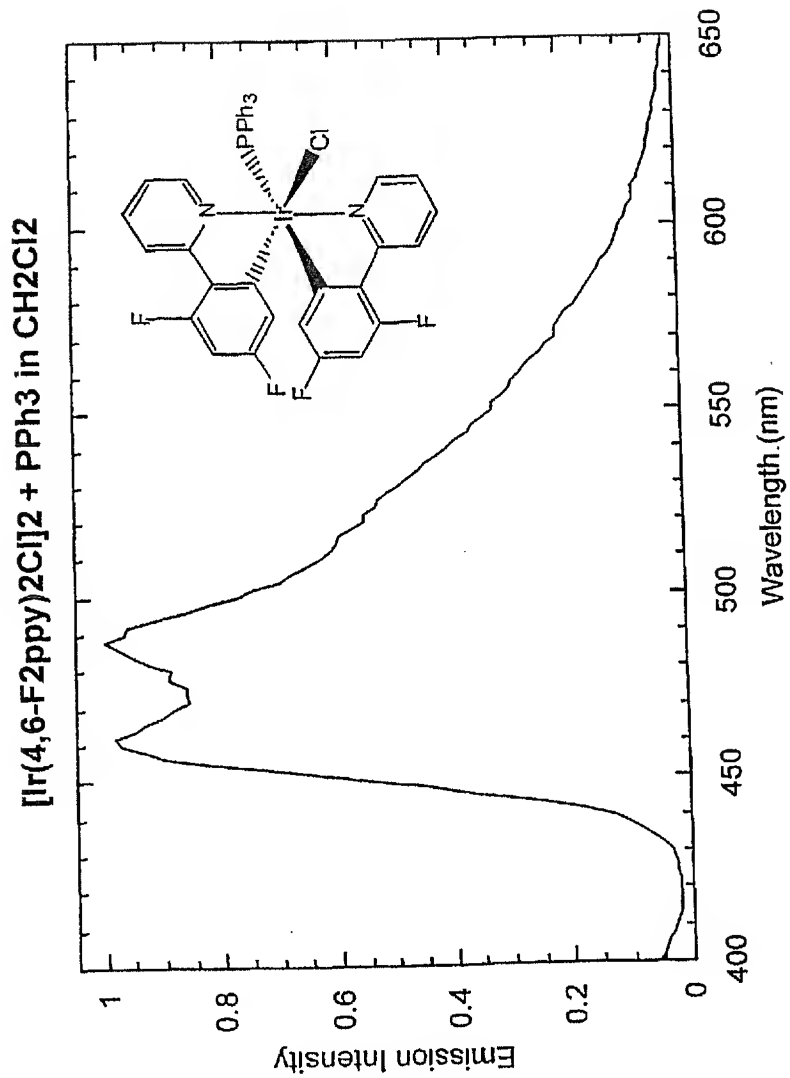

[Ir(4,6-F2ppy)2Cl]2 + PPh3 in CH2Cl2
Emission Intensity
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
Wavelength (nm)
PPh3
Cl
N
N
F
F
F
F

Figure 7e

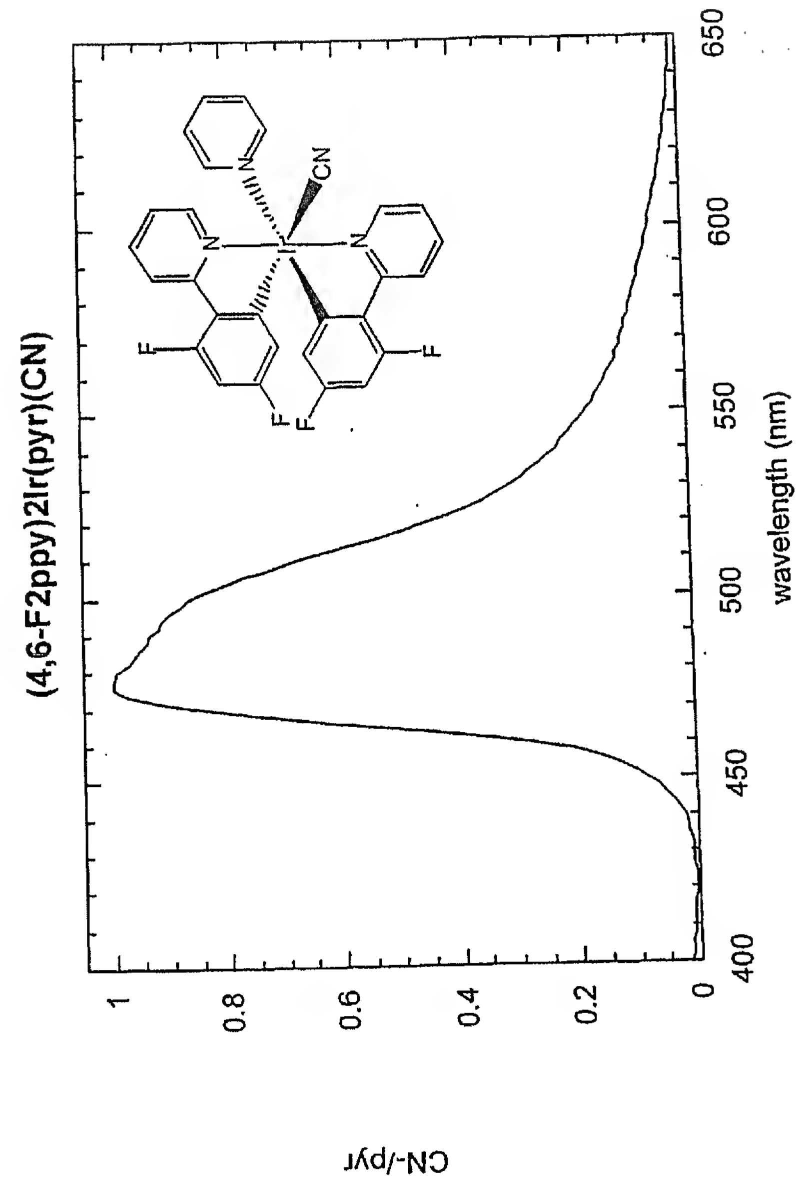

(4,6-F2ppy)2Ir(pyr)(CN)
CN-/pyr
wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
CN
N
Ir
F

Figure 7f

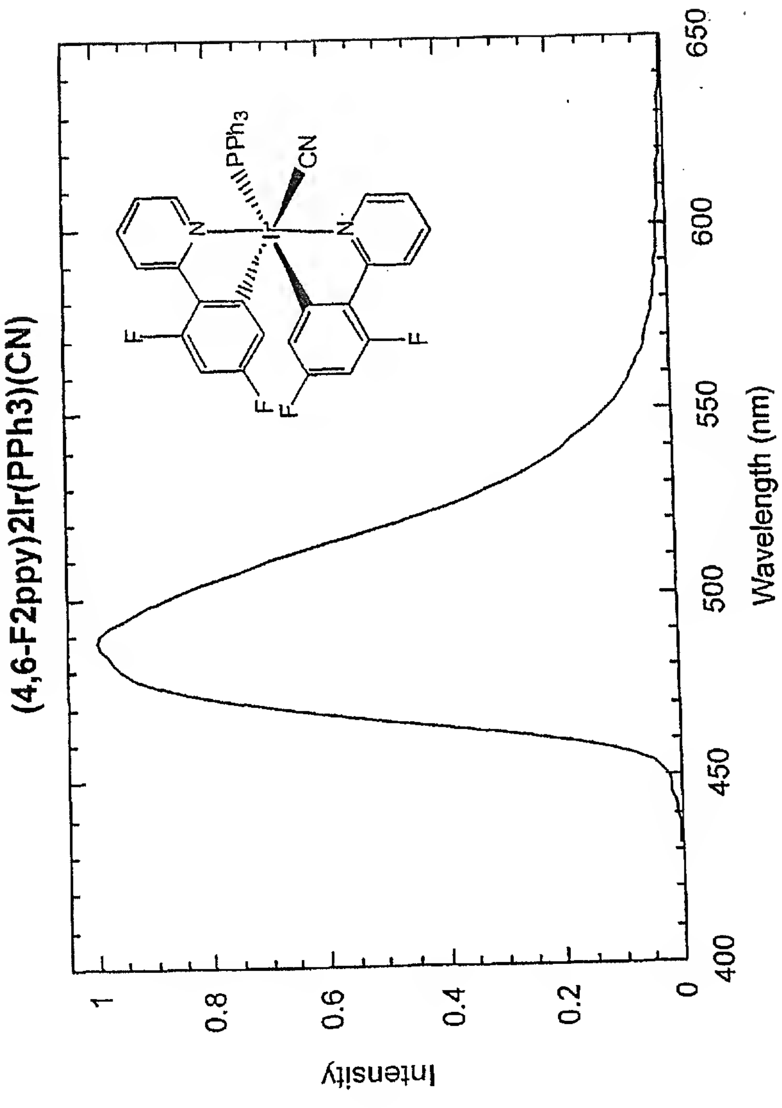

(4,6-F2ppy)2Ir(PPh3)(CN)
Intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
PPh3
CN
N
N
Ir
F
F
F
F

Figure 7g

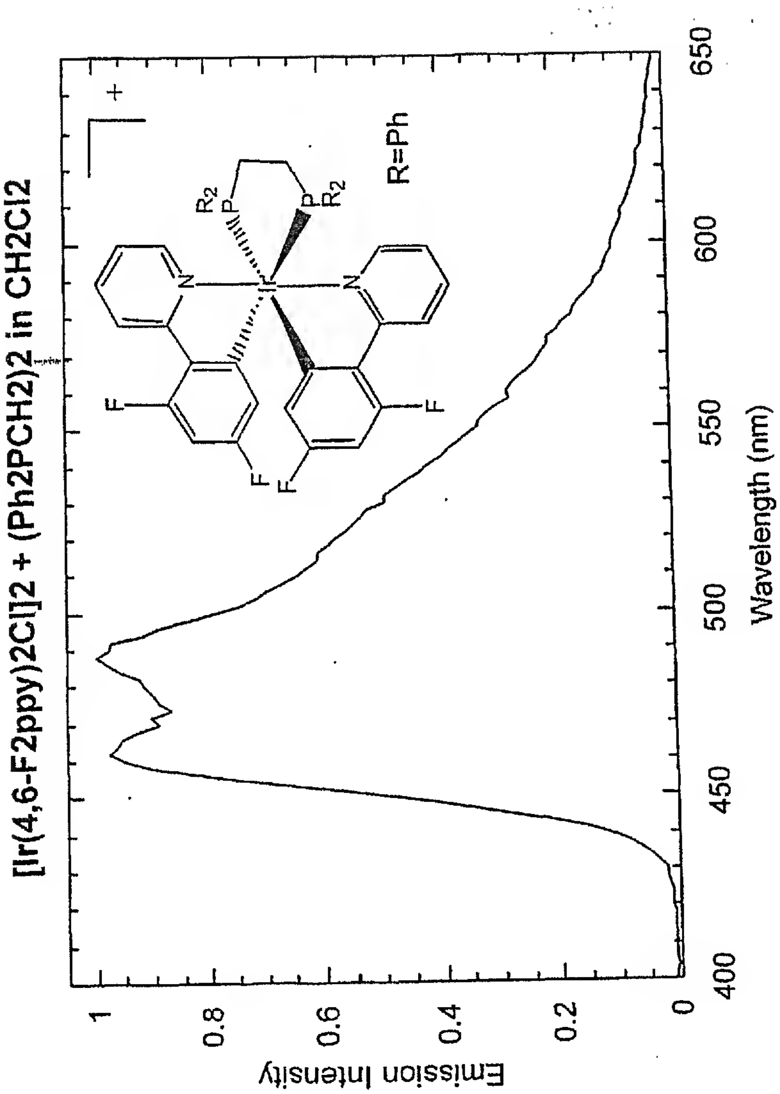

[Ir(4,6-F2ppy)2Cl]2 + (Ph2PCH2)2 in CH2Cl2
R=Ph
Emission Intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650

Figure 7h

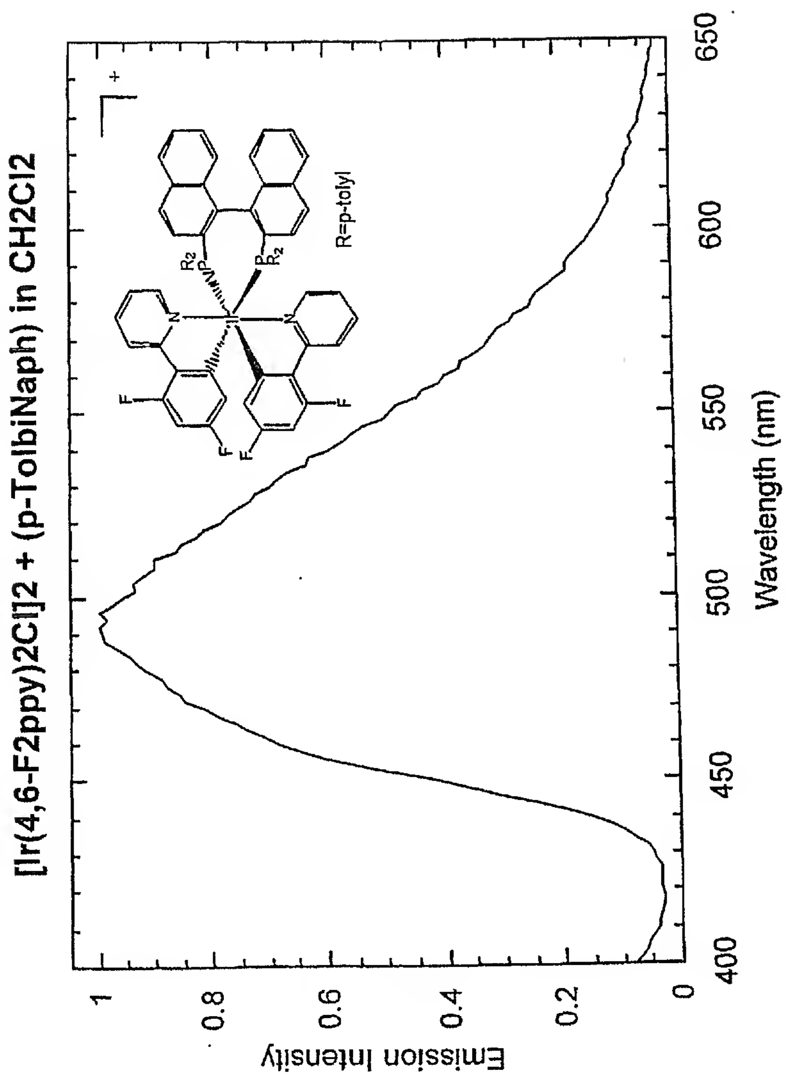

[Ir(4,6-F2ppy)2Cl]2 + (p-TolbiNaph) in CH2Cl2
Emission Intensity
Wavelength (nm)
R=p-tolyl
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650

Figure 7i

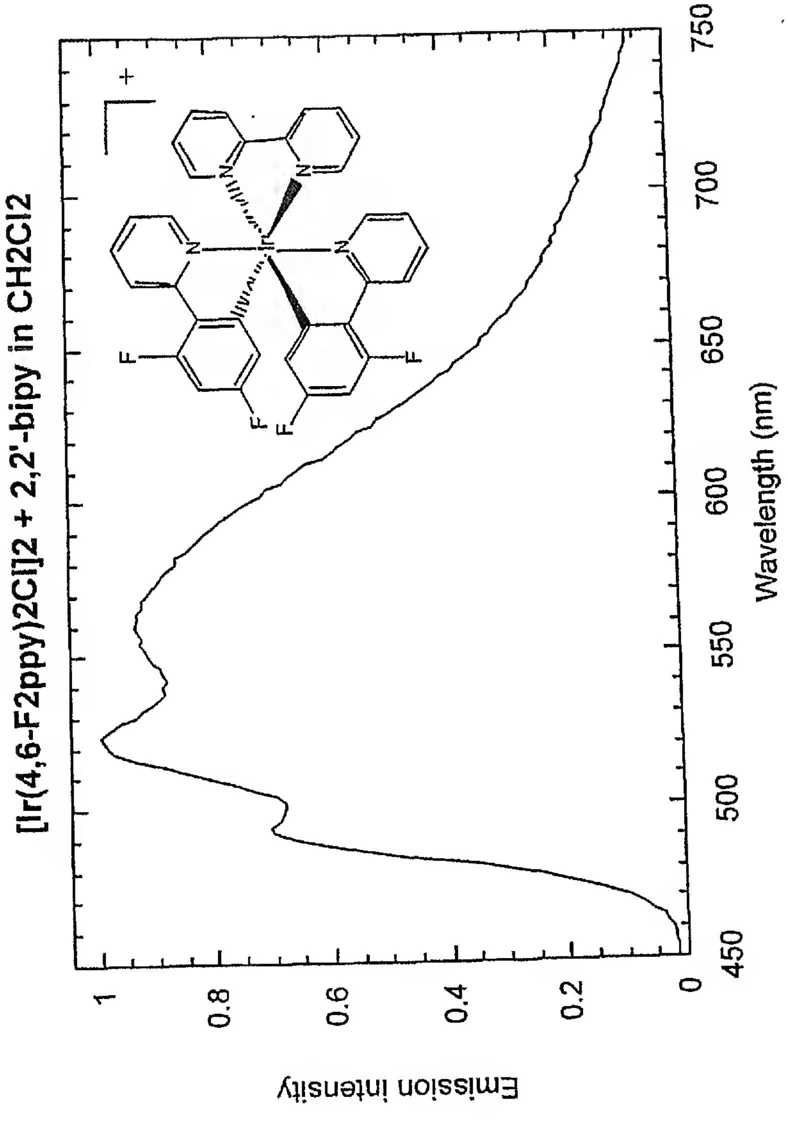

[Ir(4,6-F2ppy)2Cl]2 + 2,2'-bipy in CH2Cl2
Emission intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
450
500
550
600
650
700
750
F
F
F
F
N
N
N
N
Ir
+

Figure 7j

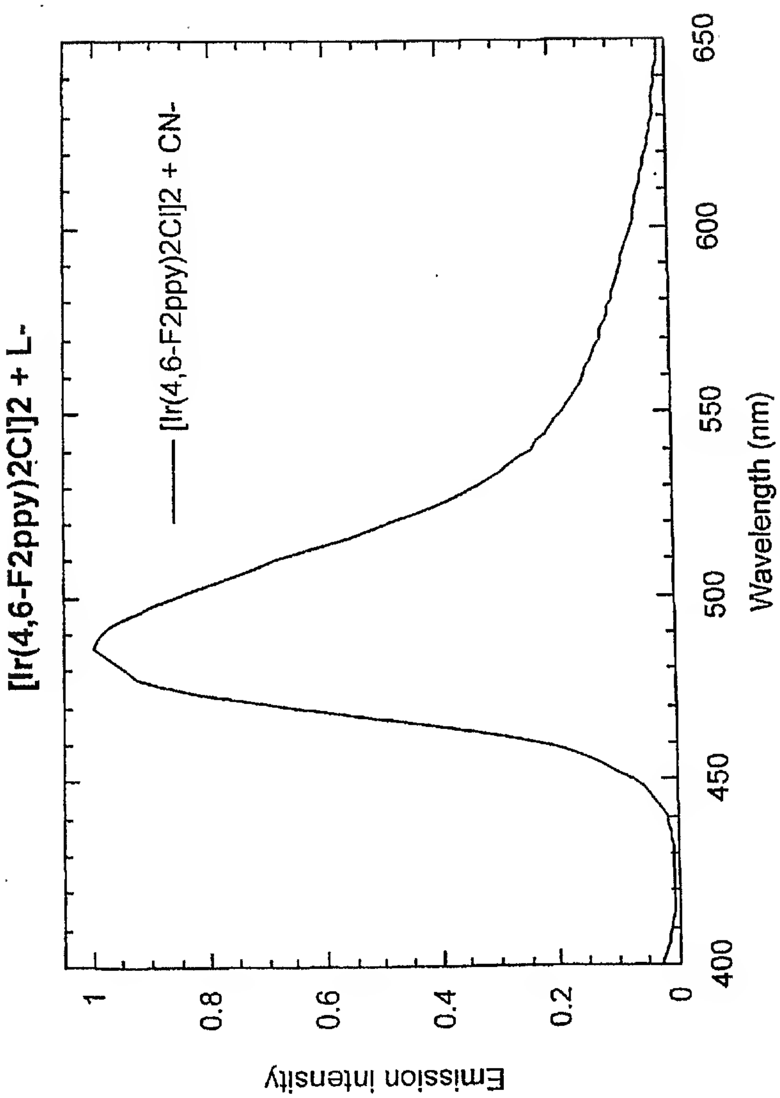

[Ir(4,6-F2ppy)2Cl]2 + L-
[Ir(4,6-F2ppy)2Cl]2 + CN-
Emission intensity
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
Wavelength (nm)

Figure 7k

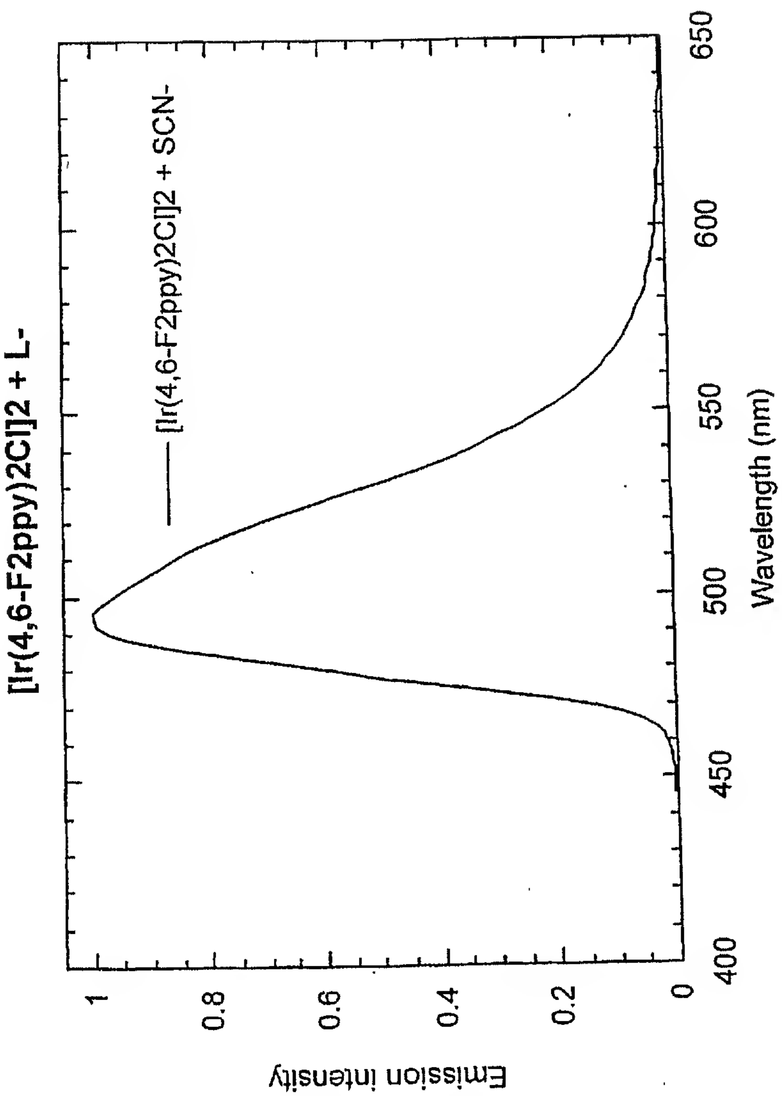

[Ir(4,6-F2ppy)2Cl]2 + L-
[Ir(4,6-F2ppy)2Cl]2 + SCN-
Emission intensity
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
Wavelength (nm)

Figure 7l

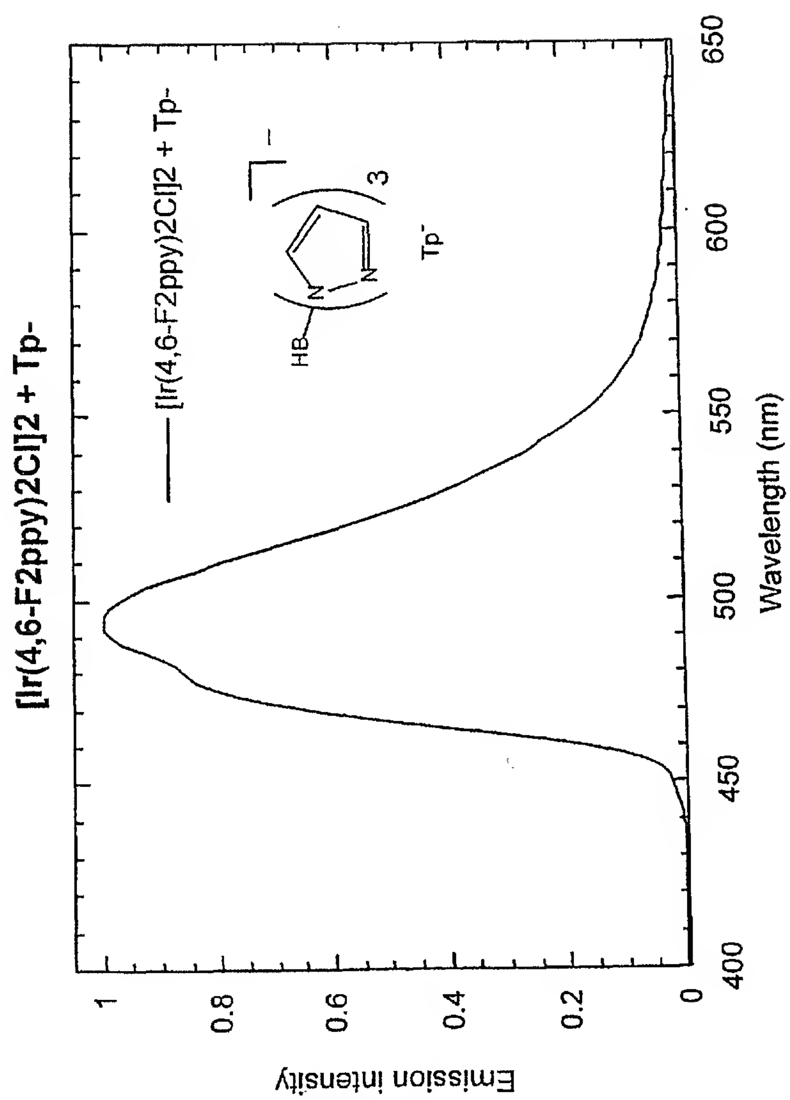

[Ir(4,6-F2ppy)2Cl]2 + Tp-
[Ir(4,6-F2ppy)2Cl]2 + Tp-
HB
N
N
3
Tp⁻
Emission intensity
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
Wavelength (nm)

Figure 7m

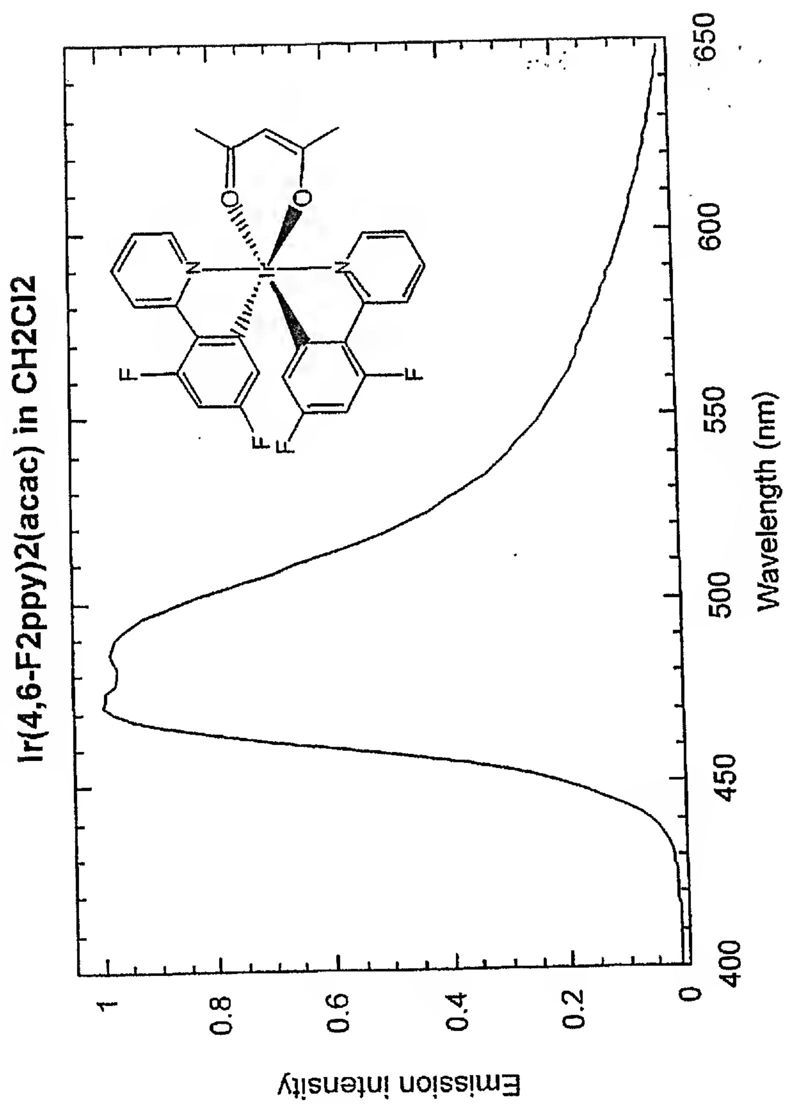

Ir(4,6-F2ppy)2(acac) in CH2Cl2
Emission intensity
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
Wavelength (nm)
F
F
F
F
N
N
Ir
O
O

Figure 7n

(4,6-F2ppy)2Ir(glycine)

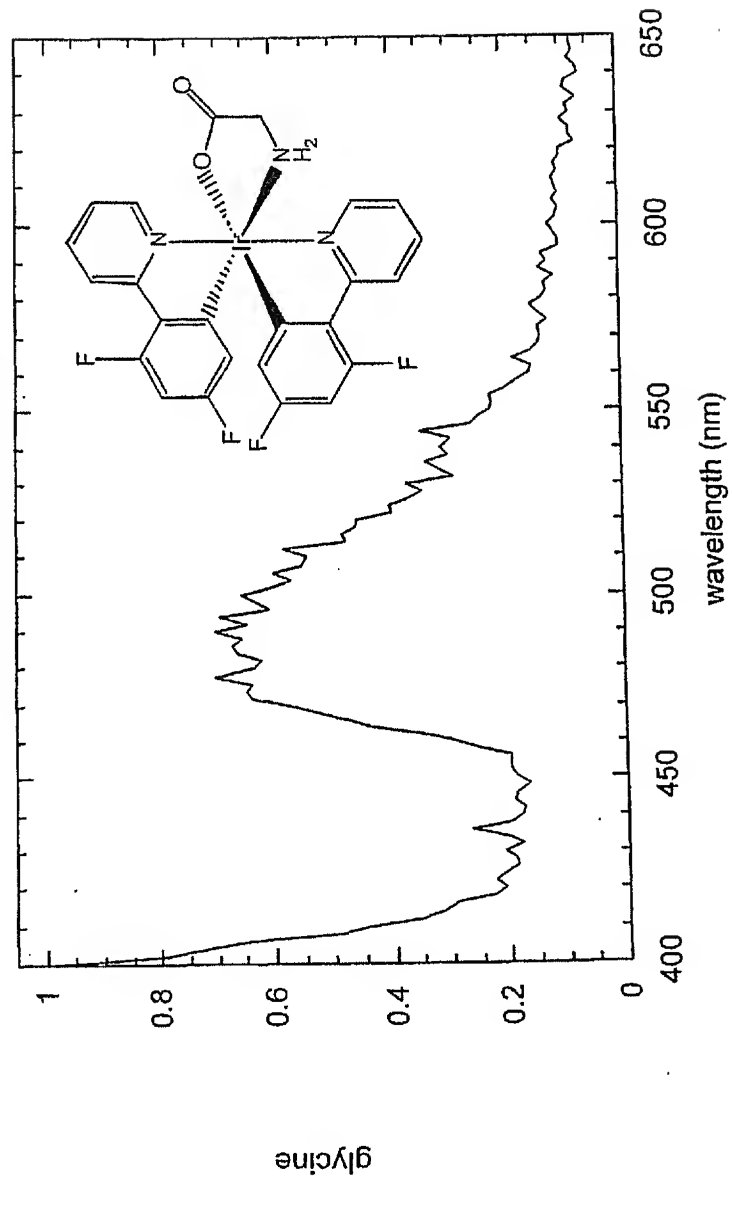


Figure 7o

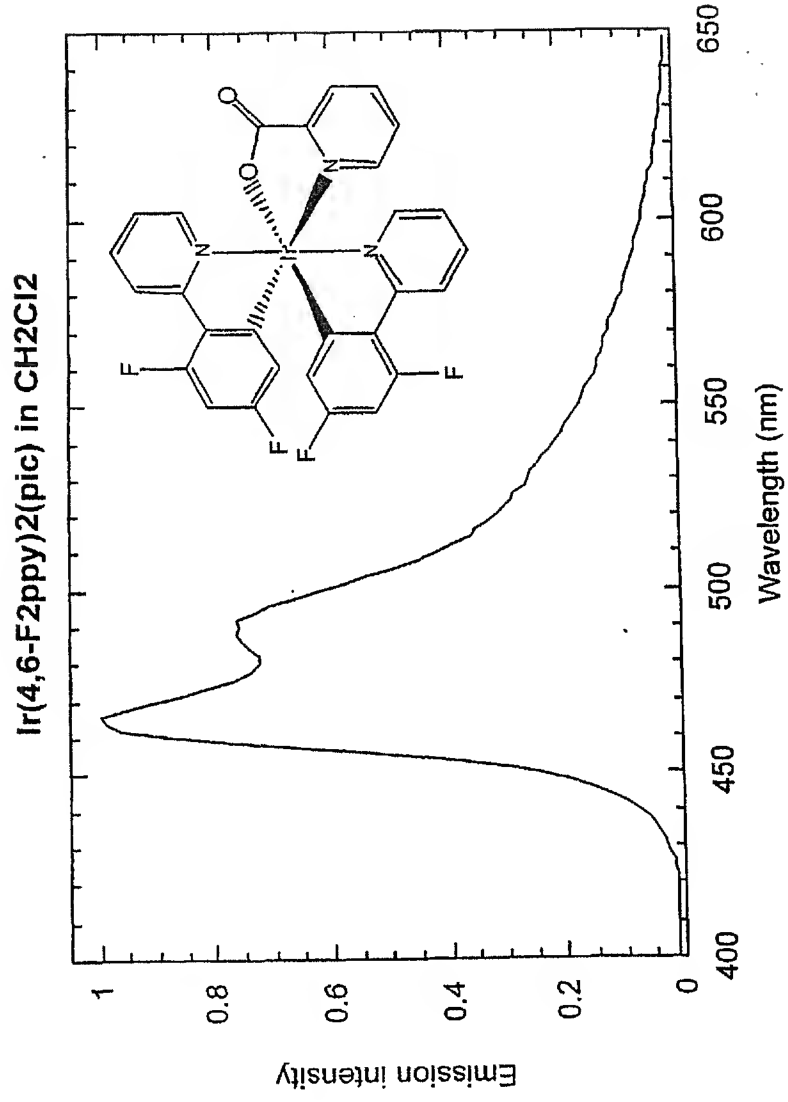

Ir(4,6-F2ppy)2(pic) in CH2Cl2
Emission intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
F
F
F
F
N
N
N
O
O
Ir

Figure 7p

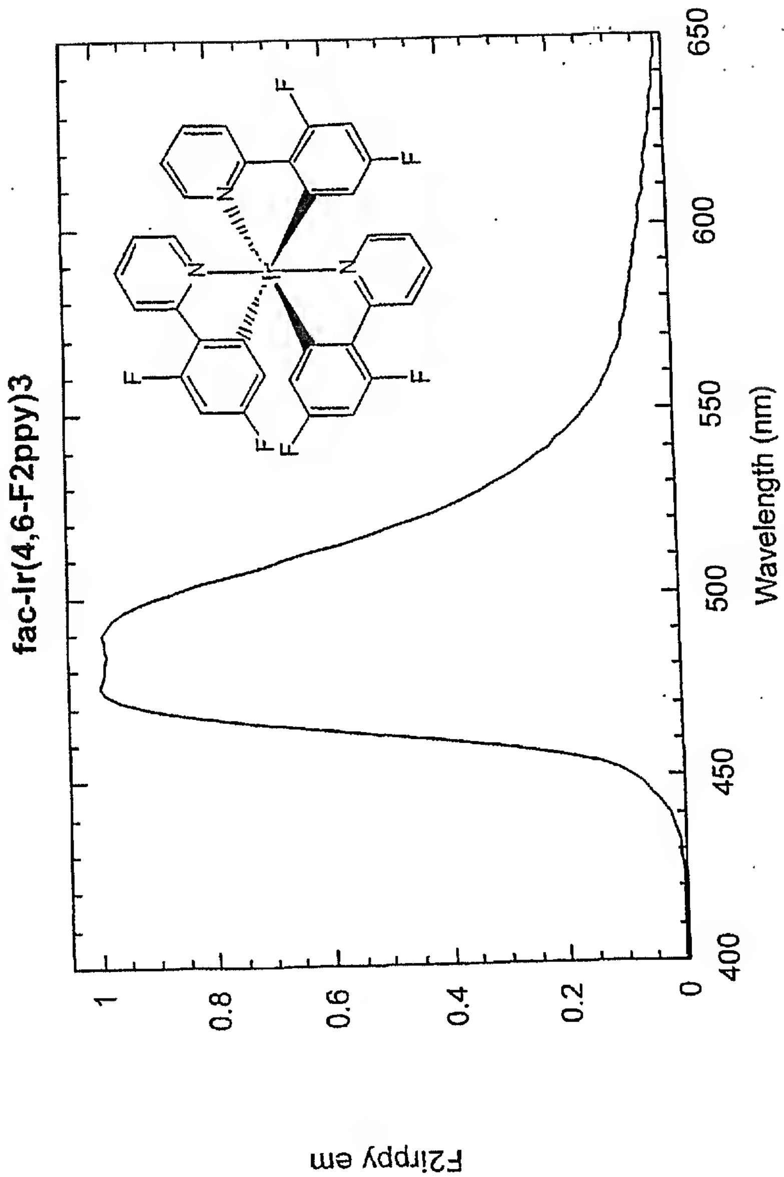

fac-Ir(4,6-F2ppy)3
F2irppy em
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650
F
N
Ir

Figure 7q

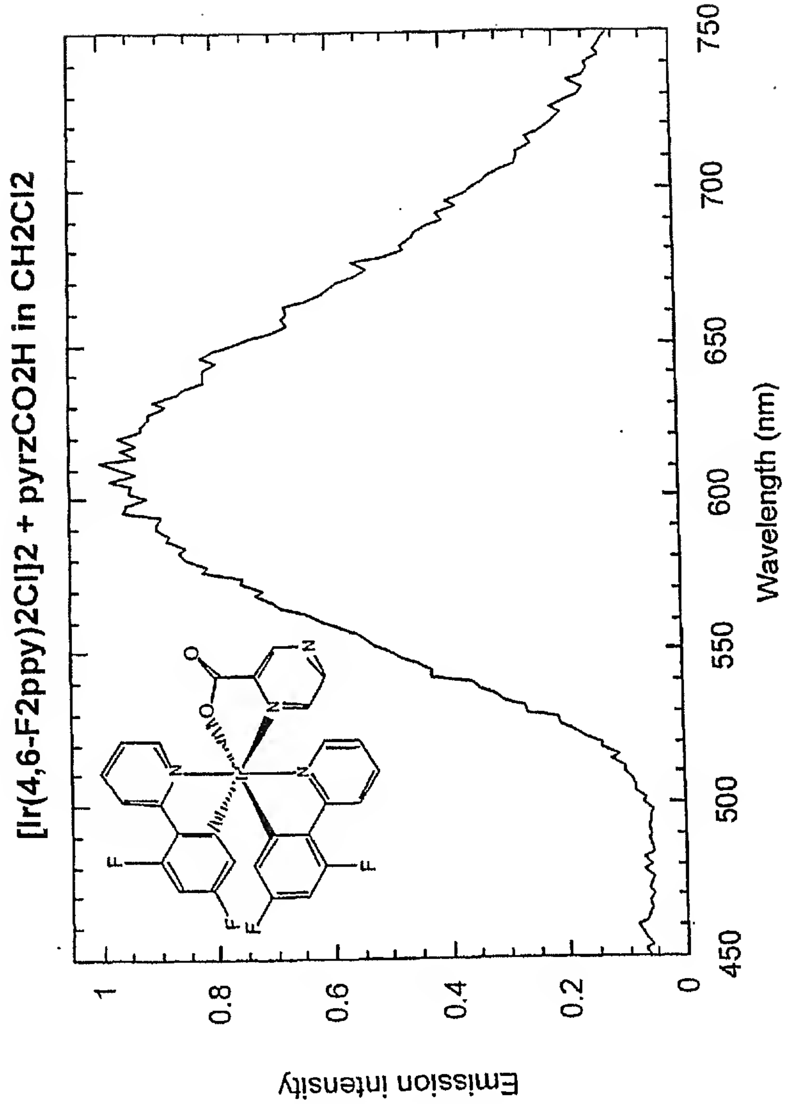

[Ir(4,6-F2ppy)2Cl]2 + pyrzCO2H in CH2Cl2
Emission intensity
Wavelength (nm)
0
0.2
0.4
0.6
0.8
1
450
500
550
600
650
700
750

Figure 7r

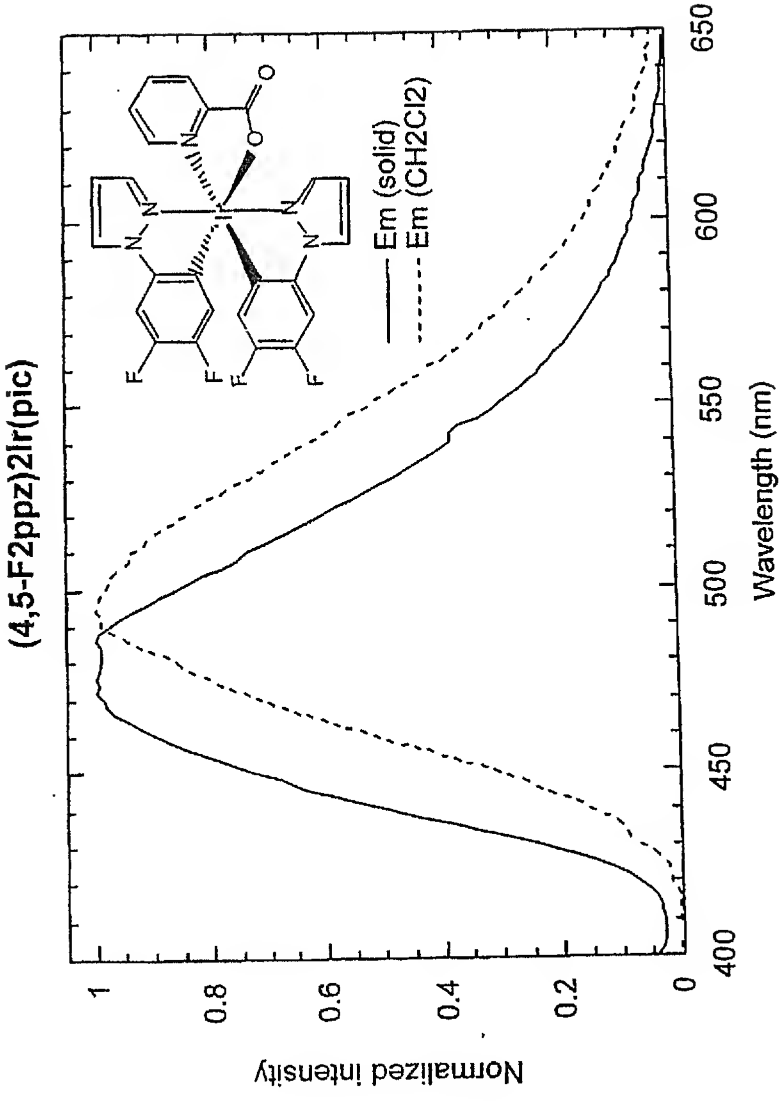

(4,5-F2ppz)2Ir(pic)
Normalized intensity
Wavelength (nm)
Em (solid)
Em (CH2Cl2)
0
0.2
0.4
0.6
0.8
1
400
450
500
550
600
650

Figure 8a

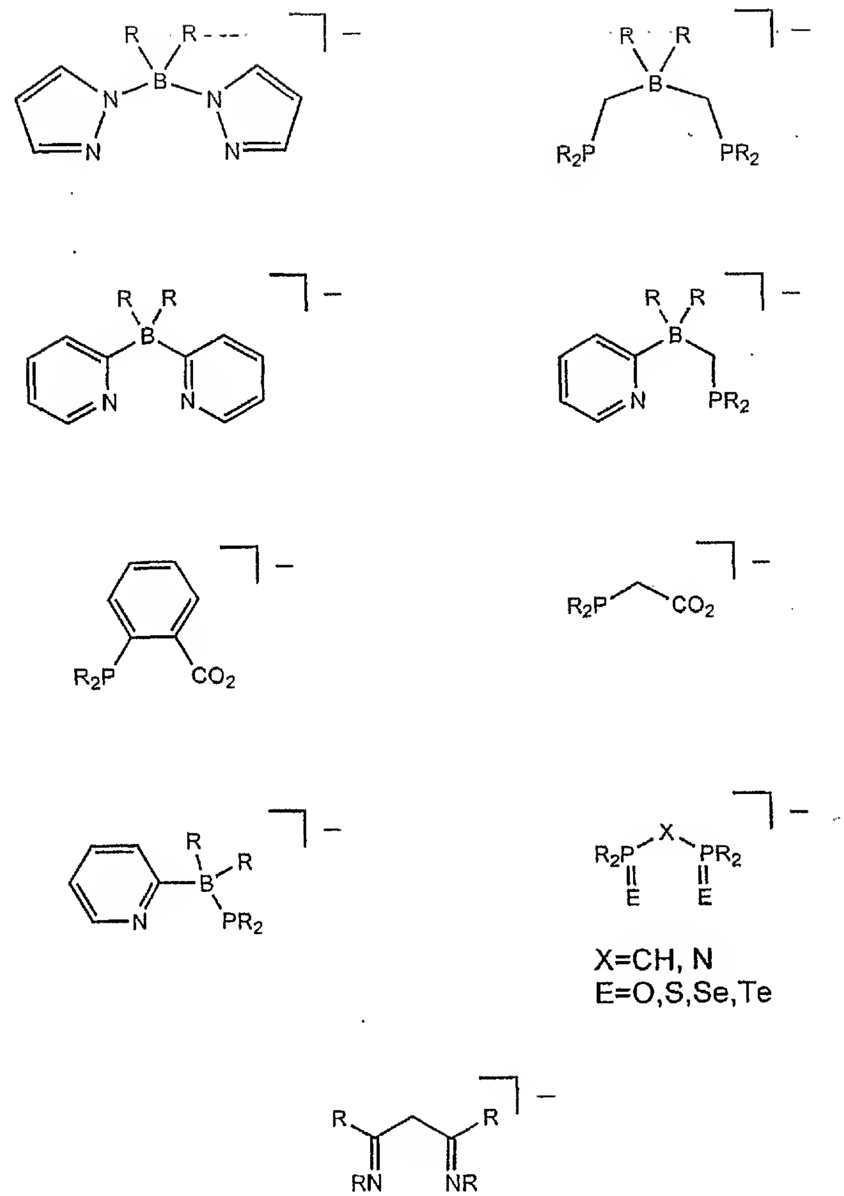
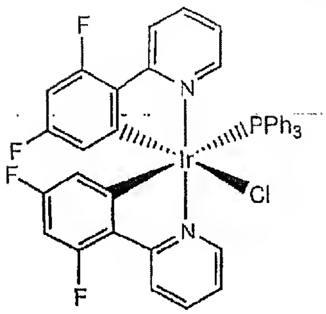
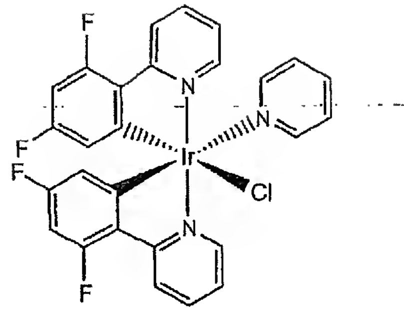
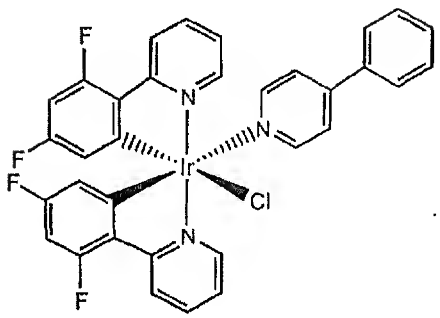
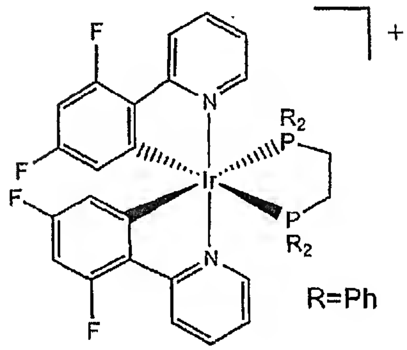


Figure 8b

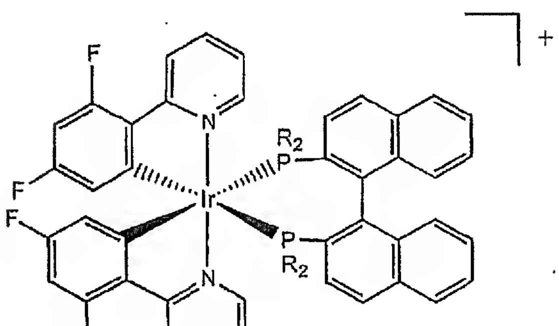




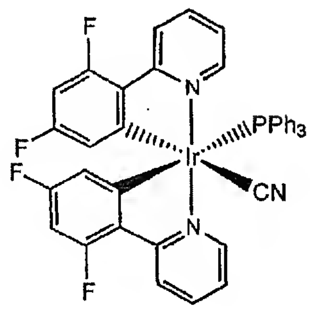


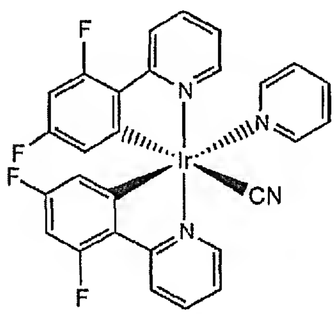


R=Ph



R=p-tolyl





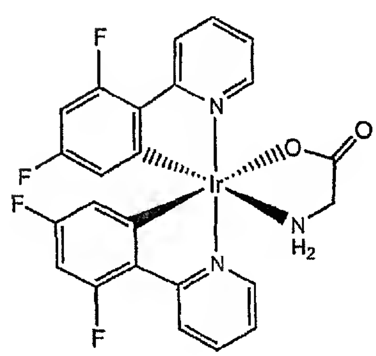
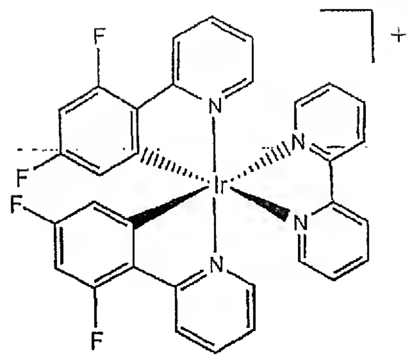
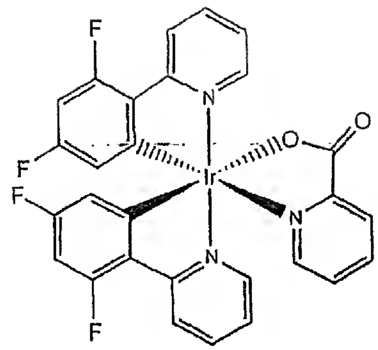
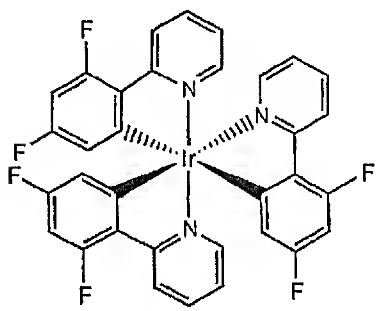
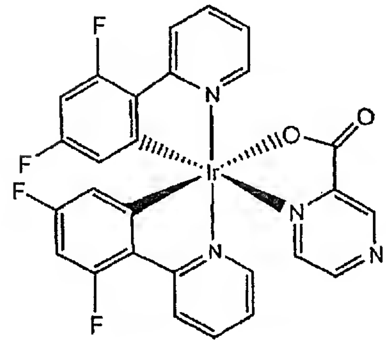


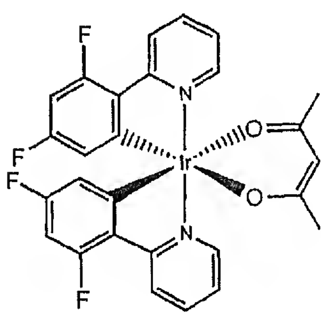
Figure 8c

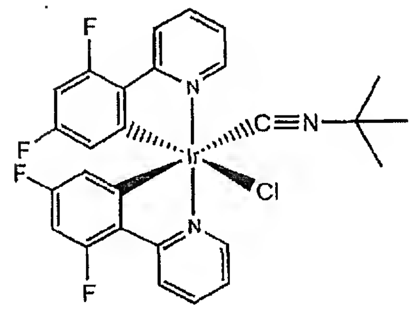












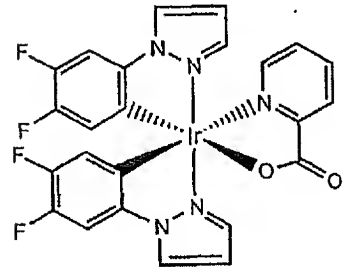
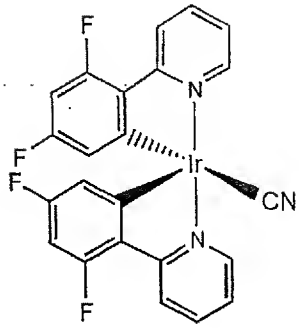
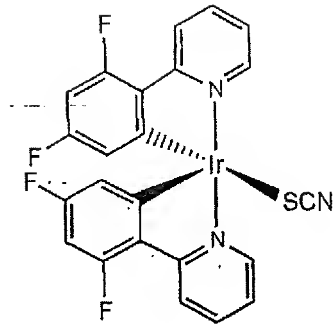
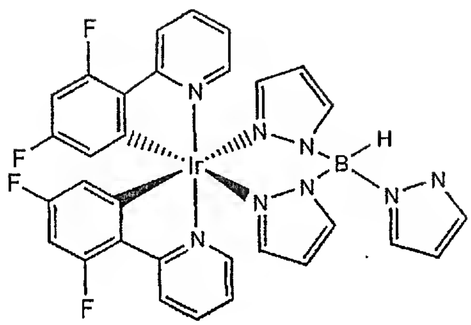
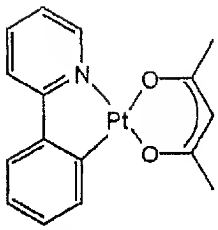


figure 8d



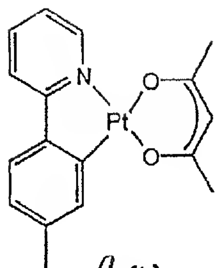






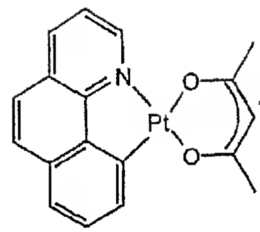
9(a)

(ppy)Pt(acac)



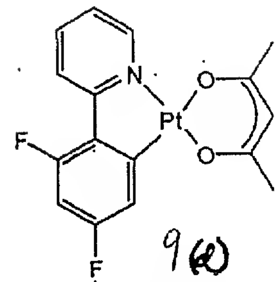
9(b)

(tpy)Pt(acac)



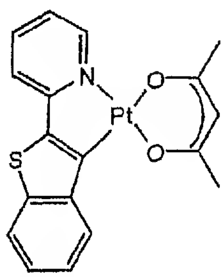
9(c)

(bzq)Pt(acac)



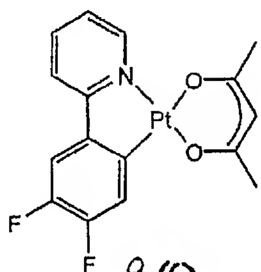
9(d)

(4,6-F_2ppy)Pt(acac)



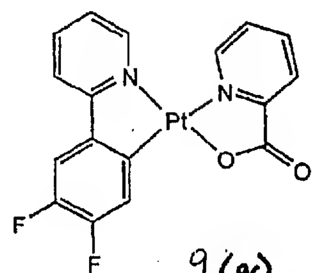
9(e)

(btp)Pt(acac)



9(f)

(4,5-F_2ppy)Pt(acac)



9(g)

(4,5-F_2ppy)Pt(pico)

Figures 9(a) - 9(g)

Figure 10: This Emission spectrum shows the spectra of both $Pt(ppy)_2$ and $Pt(ppy)_2Br_2$. The former gives green emission, partly form MLCT transitions, and the latter gives blue emission, predominantly from a triplet π-π^* transition. The structure observed for the $Pt(ppy)_2Br_2$ spectrum is consistent with ligand centered emission. The luminescent lifetimes for the two complexes are 4 and 150 μsec.

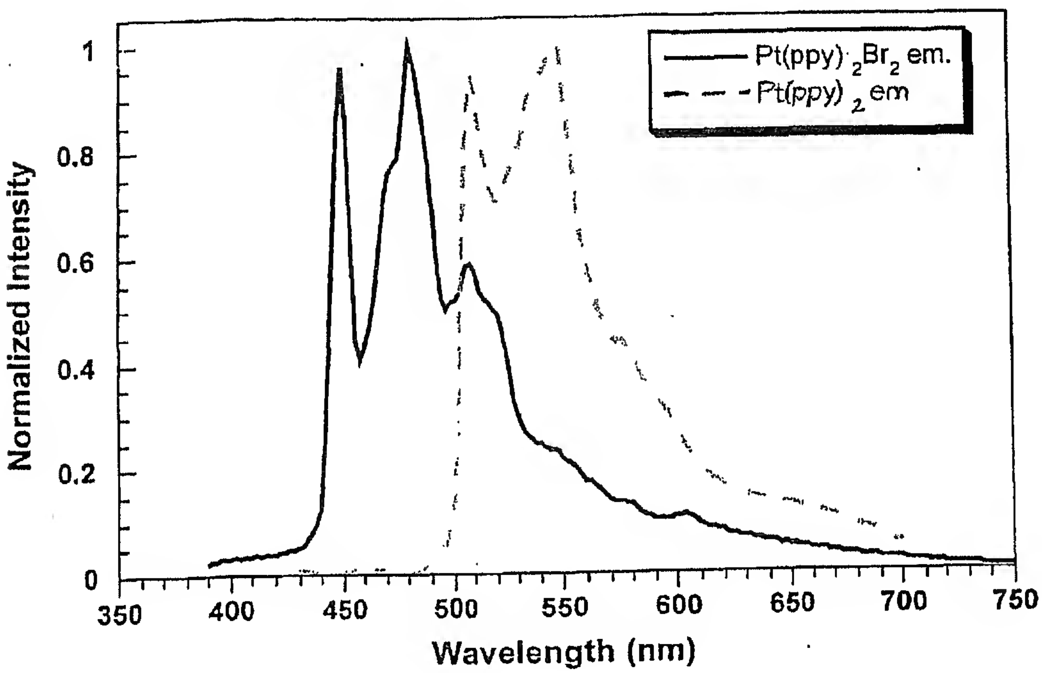


Figure 10

Figure 11: This plot shows the emission spectra of (ppy)$AuCl_2$ and (ppy)A 2,2'-biphenylene). Both emit from ligand triplet π-π* transitions.

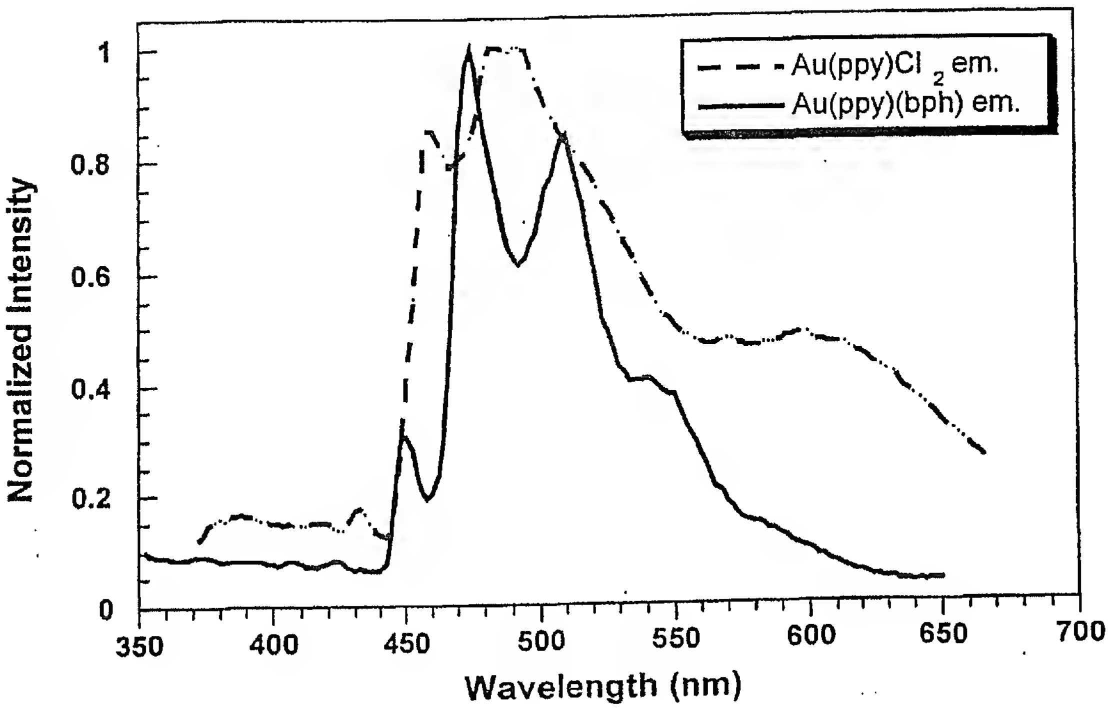


Figure 11

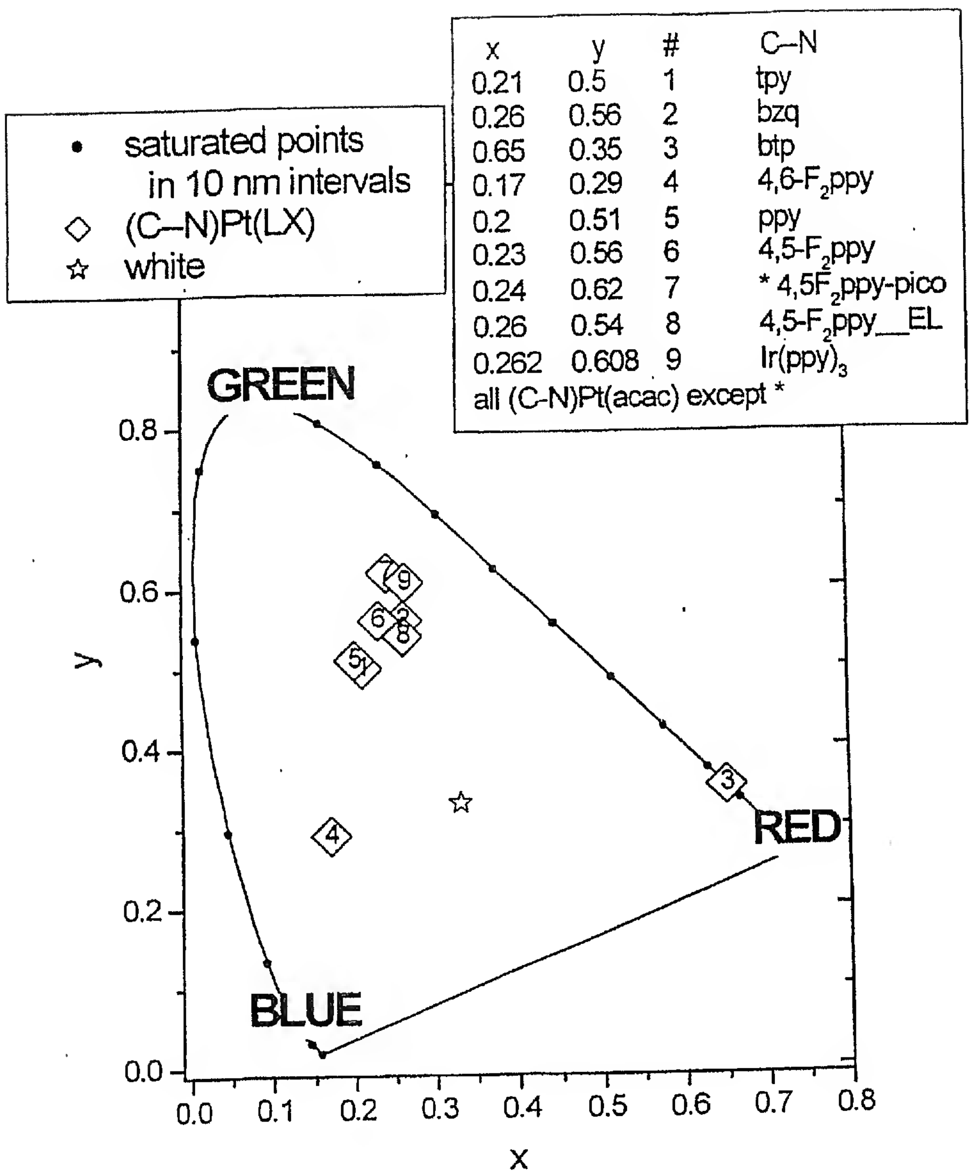

saturated points in 10 nm intervals
(C–N)Pt(LX)
white
x y # C–N
0.21 0.5 1 tpy
0.26 0.56 2 bzq
0.65 0.35 3 btp
0.17 0.29 4 4,6-F$_2$ppy
0.2 0.51 5 ppy
0.23 0.56 6 4,5-F$_2$ppy
0.24 0.62 7 * 4,5F$_2$ppy-pico
0.26 0.54 8 4,5-F$_2$ppy__EL
0.262 0.608 9 Ir(ppy)$_3$
all (C-N)Pt(acac) except *
GREEN
RED
BLUE
0.0
0.2
0.4
0.6
0.8
y
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8
x

Figure 12

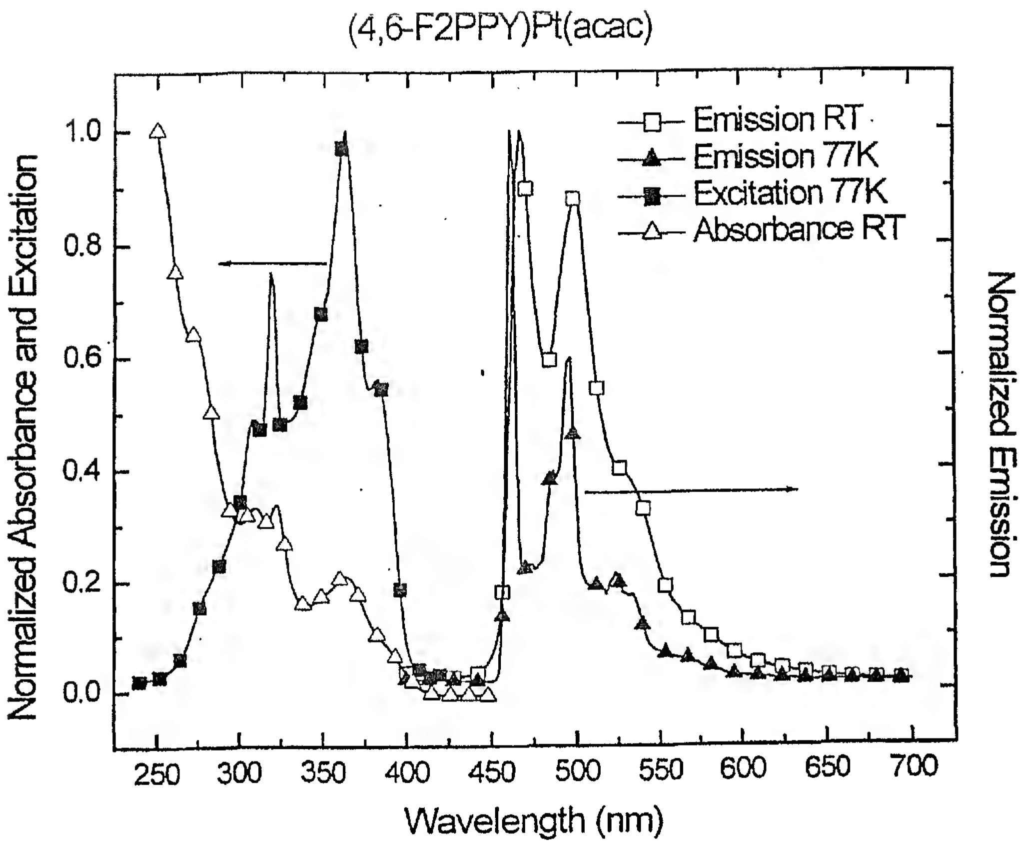

(4,6-F2PPY)Pt(acac)
Emission RT
Emission 77K
Excitation 77K
Absorbance RT
Normalized Absorbance and Excitation
Normalized Emission
Wavelength (nm)
1.0
0.8
0.6
0.4
0.2
0.0
250
300
350
400
450
500
550
600
650
700

Figure 13

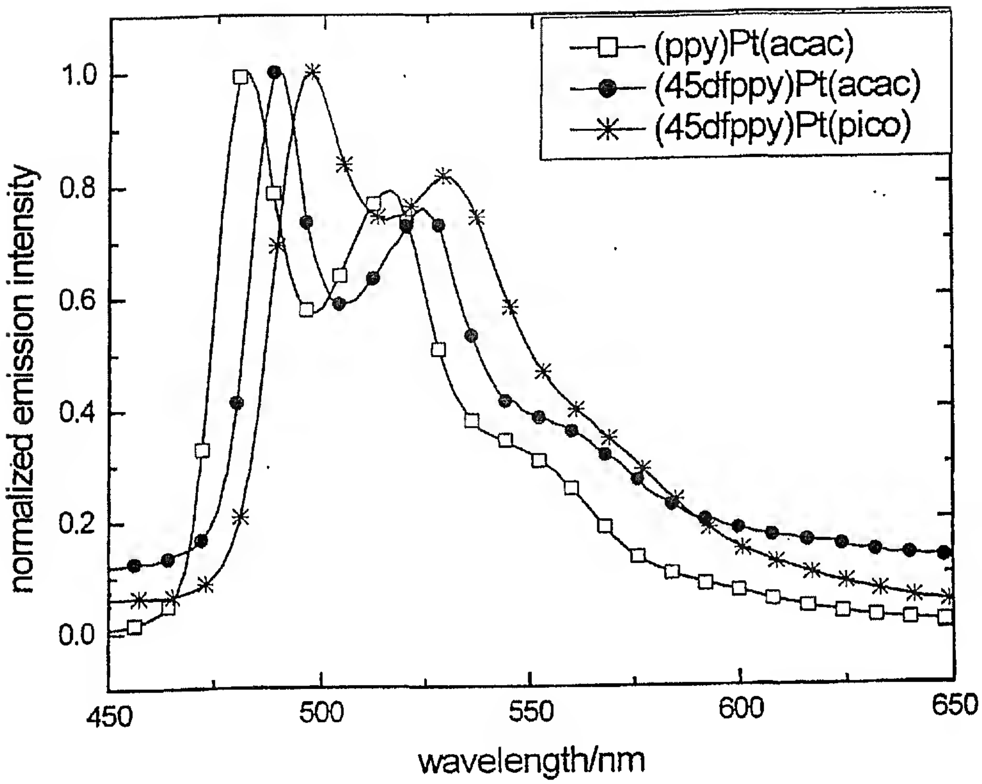

(ppy)Pt(acac)
(45dfppy)Pt(acac)
(45dfppy)Pt(pico)
normalized emission intensity
0.0
0.2
0.4
0.6
0.8
1.0
450
500
550
600
650
wavelength/nm

Figure 14

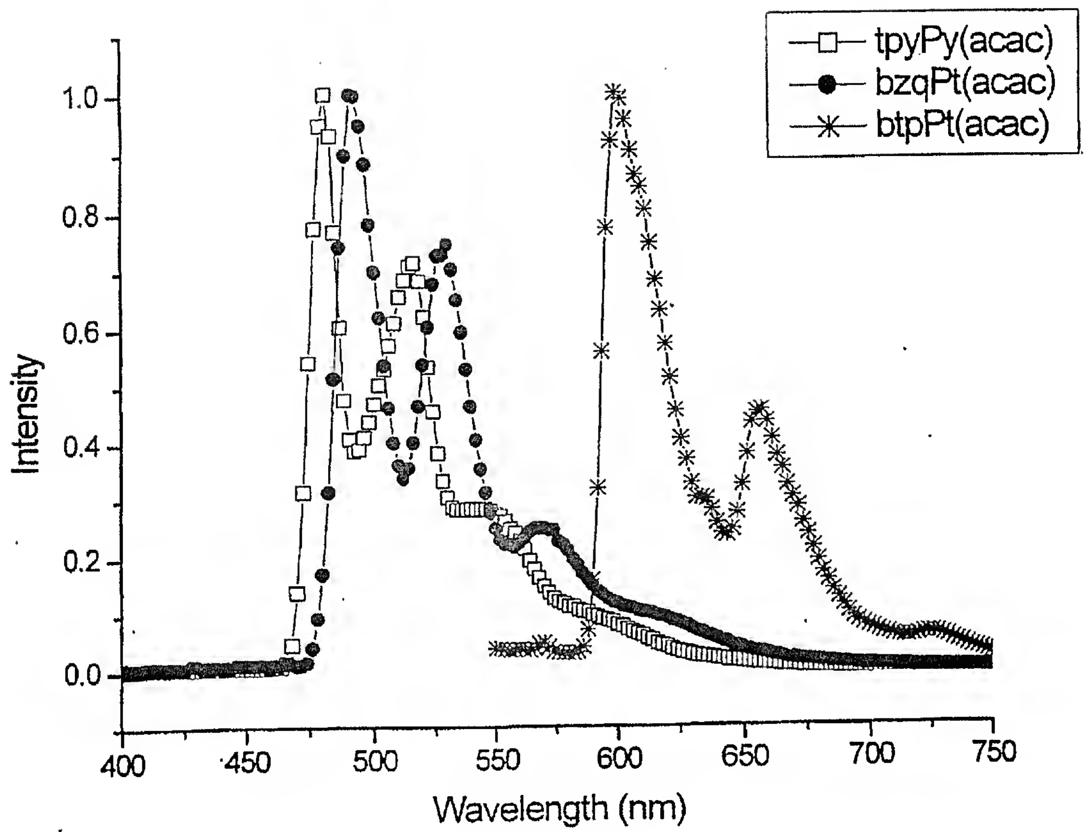

tpyPy(acac)
bzqPt(acac)
btpPt(acac)
Intensity
1.0
0.8
0.6
0.4
0.2
0.0
400
450
500
550
600
650
700
750
Wavelength (nm)

Figure 15

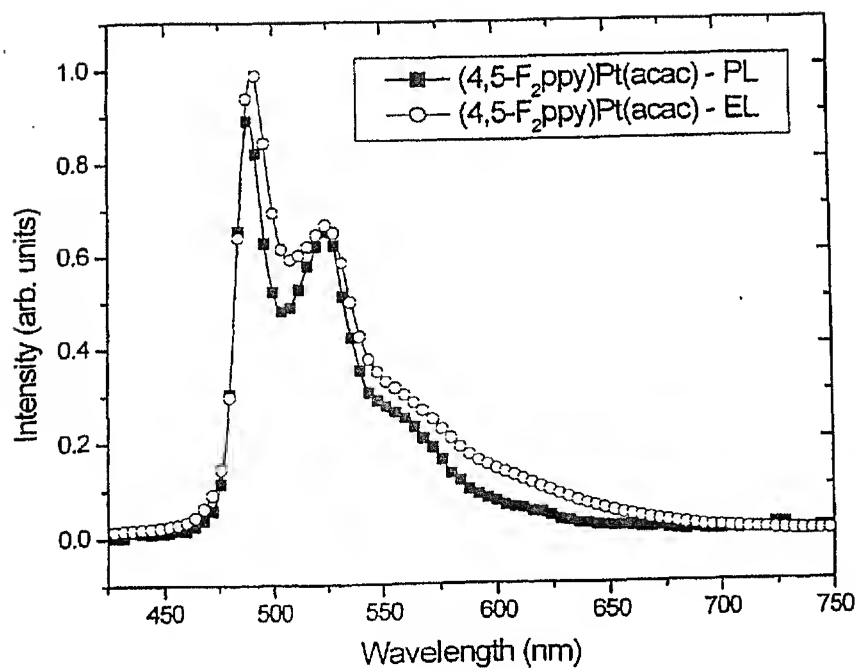

(4,5-F2ppy)Pt(acac) - PL
(4,5-F2ppy)Pt(acac) - EL
Intensity (arb. units)
1.0
0.8
0.6
0.4
0.2
0.0
450
500
550
600
650
700
750
Wavelength (nm)

Figure 16

FIG. 17

PRB 62

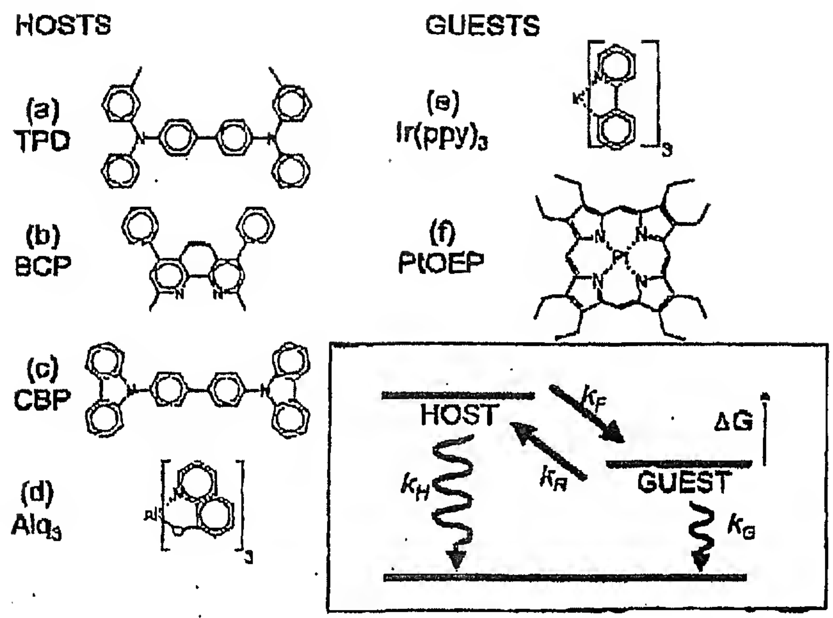

HOSTS
GUESTS
(a)
TPD
(e)
Ir(ppy)3
(b)
BCP
(f)
PtOEP
(c)
CBP
(d)
Alq3
HOST
GUEST
ΔG
kF
kR
kH
kG

FIG. 18

PRB 62

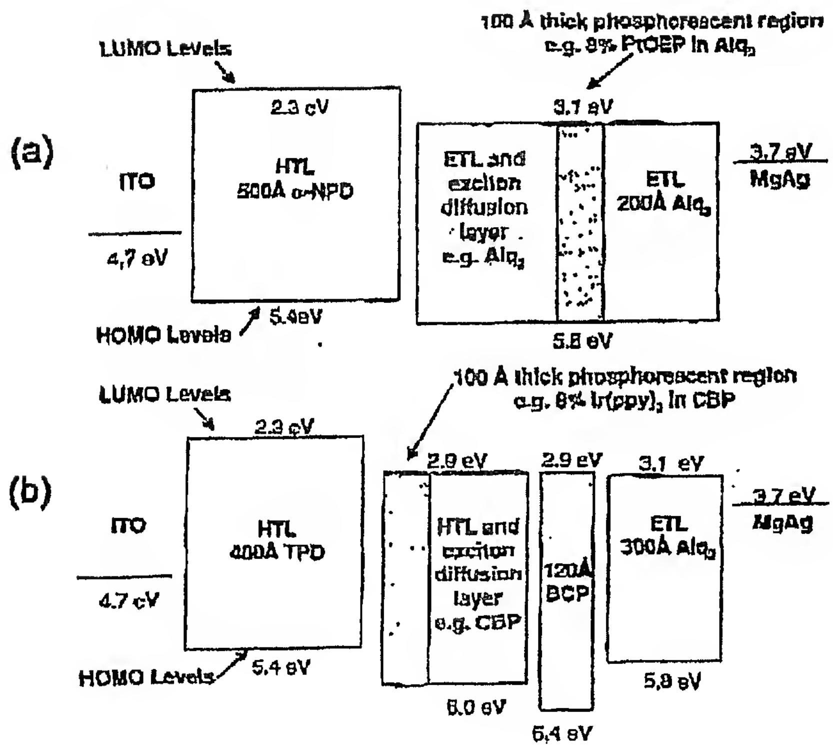

LUMO Levels
100 Å thick phosphorescent region
e.g. 8% PtOEP in Alq₃
(a)
ITO
4,7 eV
2.3 eV
HTL
500Å α-NPD
5.4eV
HOMO Levels
3.1 eV
ETL and
exciton
diffusion
layer
e.g. Alq₃
ETL
200Å Alq₃
5.8 eV
3.7 eV
MgAg
LUMO Levels
100 Å thick phosphorescent region
e.g. 8% Ir(ppy)₃ in CBP
(b)
ITO
4.7 eV
2.3 eV
HTL
400Å TPD
5.4 eV
HOMO Levels
2.9 eV
HTL and
exciton
diffusion
layer
e.g. CBP
6.0 eV
2.9 eV
120Å
BCP
6.4 eV
3.1 eV
ETL
300Å Alq₃
5.9 eV
3.7 eV
MgAg

FIG. 19

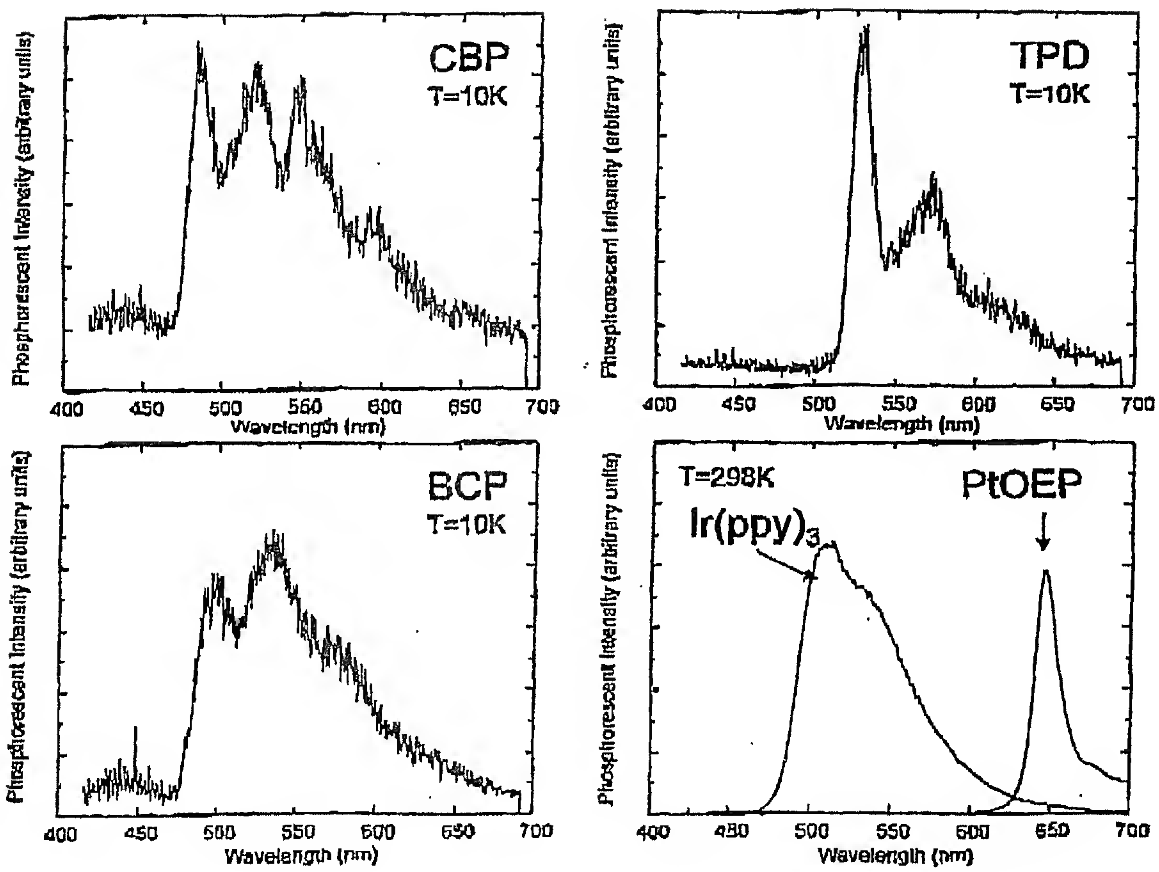

CBP
T=10K
Phosphorescent Intensity (arbitrary units)
Wavelength (nm)
400 450 500 550 600 650 700
TPD
T=10K
Phosphorescent Intensity (arbitrary units)
Wavelength (nm)
400 450 500 550 600 650 700
BCP
T=10K
Phosphorescent Intensity (arbitrary units)
Wavelength (nm)
400 450 500 550 600 650 700
T=298K
Ir(ppy)3
PtOEP
Phosphorescent Intensity (arbitrary units)
Wavelength (nm)
400 450 500 550 600 650 700

FIG. 20

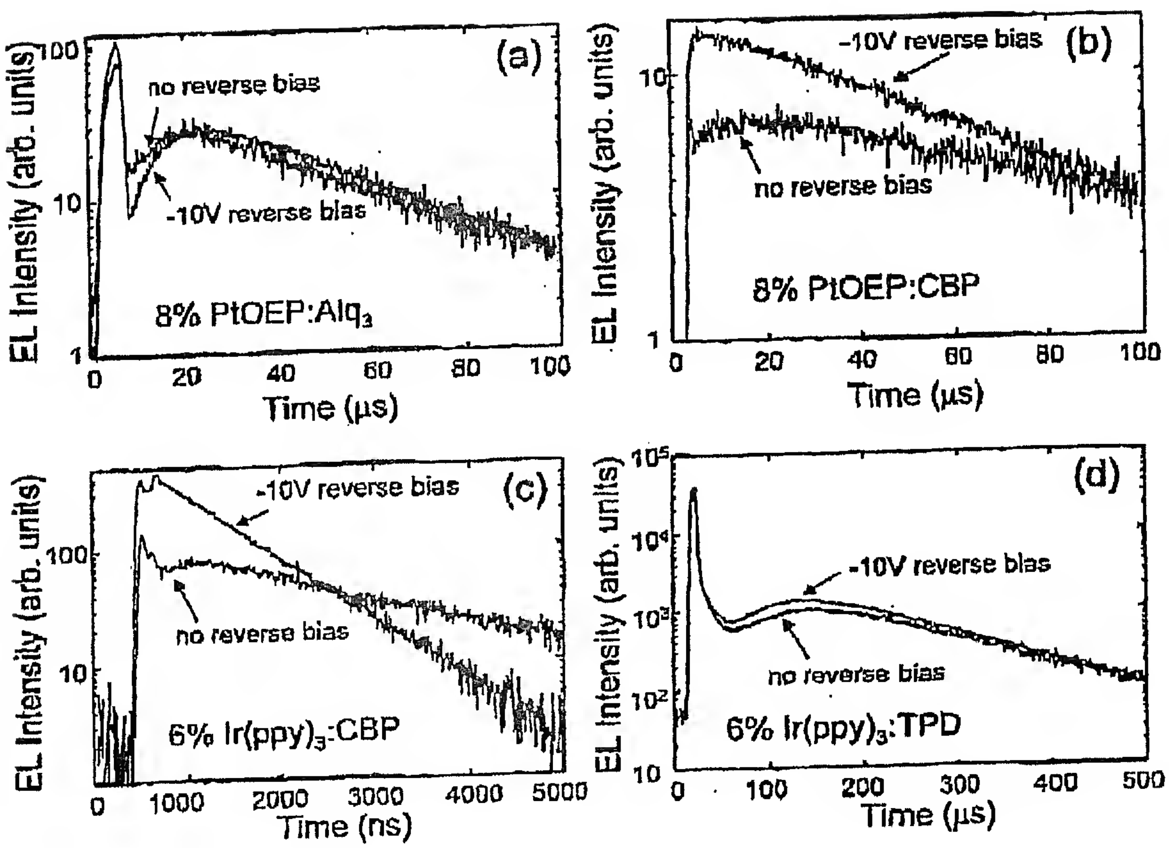

(a)
no reverse bias
-10V reverse bias
8% PtOEP:Alq$_3$
EL Intensity (arb. units)
Time (μs)
(b)
-10V reverse bias
no reverse bias
8% PtOEP:CBP
EL Intensity (arb. units)
Time (μs)
(c)
-10V reverse bias
no reverse bias
6% Ir(ppy)$_3$:CBP
EL Intensity (arb. units)
Time (ns)
(d)
-10V reverse bias
no reverse bias
6% Ir(ppy)$_3$:TPD
EL Intensity (arb. units)
Time (μs)

FIG. 21

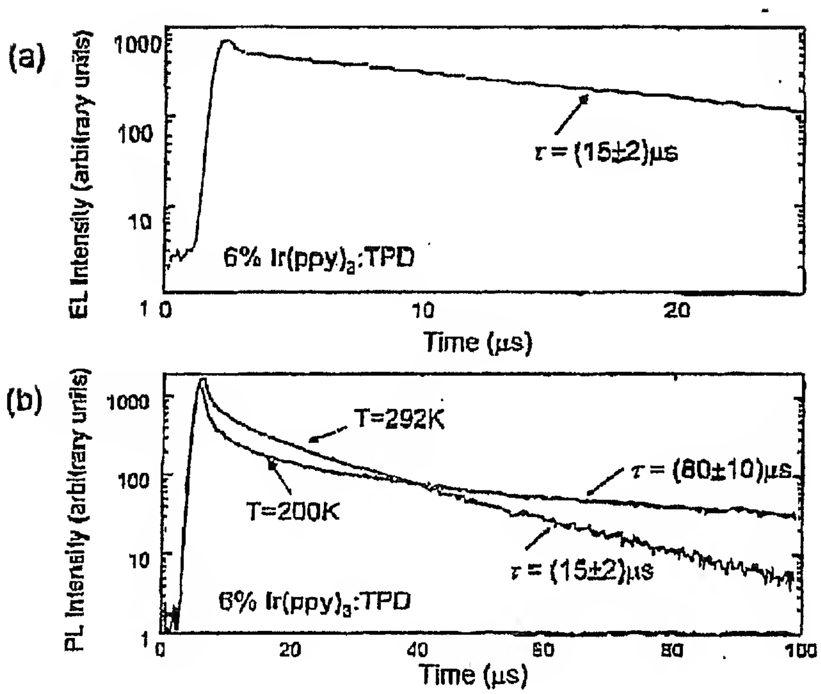

(a)
EL Intensity (arbitrary units)
1000
100
10
1
τ = (15±2)μs
6% Ir(ppy)$_3$:TPD
0
10
20
Time (μs)
(b)
PL Intensity (arbitrary units)
1000
100
10
1
T=292K
T=200K
τ = (80±10)μs
τ = (15±2)μs
6% Ir(ppy)$_3$:TPD
0
20
40
60
80
100
Time (μs)

FIG. 22

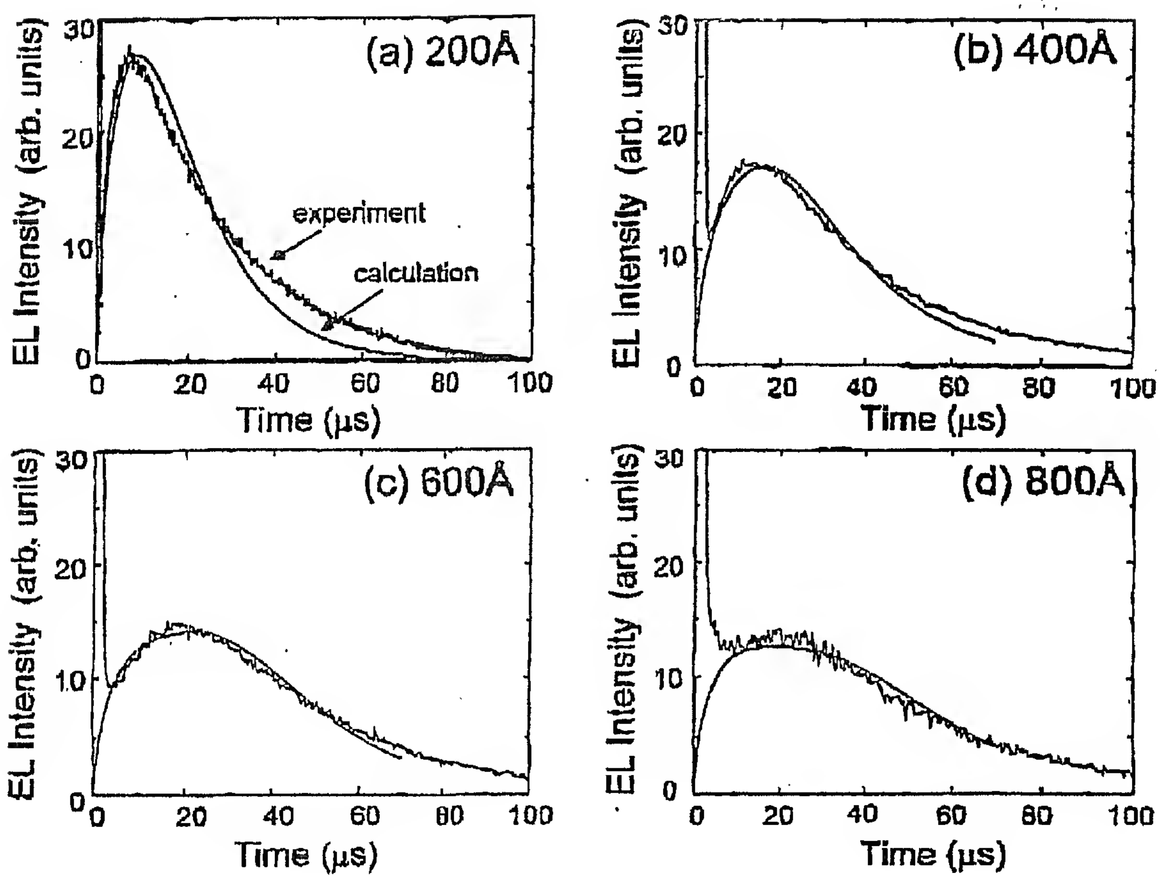
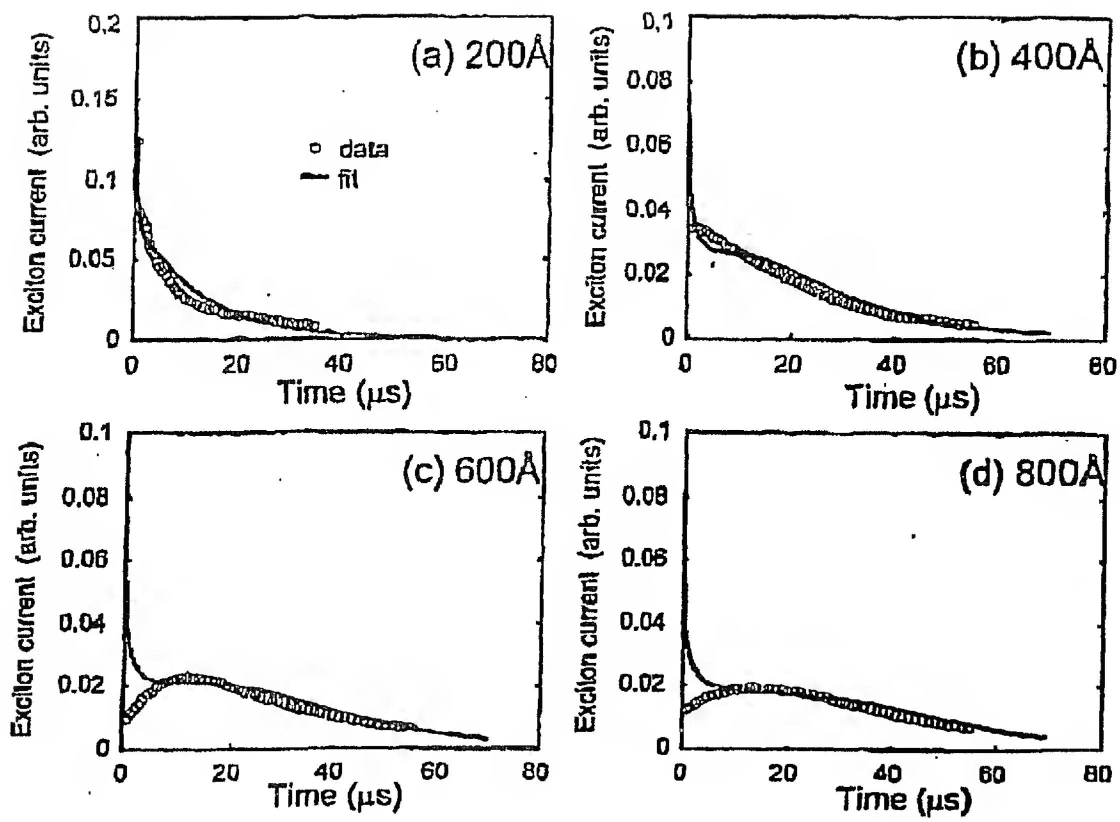

(a) 200Å
EL Intensity (arb. units)
Time (μs)
experiment
calculation
(b) 400Å
EL Intensity (arb. units)
Time (μs)
(c) 600Å
EL Intensity (arb. units)
Time (μs)
(d) 800Å
EL Intensity (arb. units)
Time (μs)

Fig. 23


(a) 200Å
data
fit
Exciton current (arb. units)
Time (μs)
0
0.05
0.1
0.15
0.2
0
20
40
60
80
(b) 400Å
Exciton current (arb. units)
Time (μs)
0
0.02
0.04
0.06
0.08
0.1
(c) 600Å
Exciton current (arb. units)
Time (μs)
(d) 800Å
Exciton current (arb. units)
Time (μs)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/25108

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :H05B 33/14; C09K 11/06; C07D 213/02, 231/10, 241/10, 333/52
US CL :Please See Extra Sheet.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 428/690, 917; 313/504, 506; 257/102; 252/301.16; 544/225, 336; 546/2, 4; 548/101, 103, 365.1, 373.1; 549/3, 49

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BALDO et al. Highly efficient phosphorescent emission from organic electroluminescent devices. Nature. 10 September 1998, Vol. 395, pages 151-154.	1-30
A	BALDO et al. Very high-efficiency green organic light-emitting devices based on electrophosphorescence. Applied Physics Letters. 5 July 1999, Vol. 75, No. 1, pages 4-6.	1-30
A	BALDO et al. High-efficiency fluorescent organic light-emitting devices using a phosphorescent sensitizer. Nature. 17 February 2000, Vol. 403, pages 750-753.	1-30

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 OCTOBER 2001	28 NOV 2001

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	MARIE R. YAMNITZKY DEBORAH THOMAS PARALEGAL SPECIALIST
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/25108

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	VON ZELEWSKY et al. Tailor made coordination compounds for photochemical purposes. Coordination Chemistry Reviews. 1994, Vol. 132, pages 75-85.	1-30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/25108

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

428/690, 917; 313/504; 257/102; 252/301.16; 544/225, 336; 546/2, 4; 548/101, 103, 365.1, 373.1; 549/3, 49

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

EAST
search terms: phosphores$, chelat$, ligand, organometal$3, metal$1organ$4, coordinat$5, complex$5, transition, metal, platinum, pt, iridium, ir, osmium, os